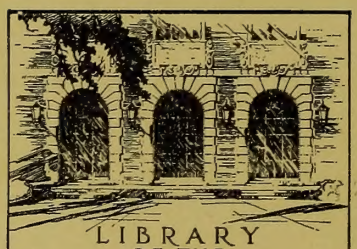

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ORDVAC MANUAL

Volume TWO

Circuit and Logical Diagrams

1952

UNIVERSITY OF ILLINOIS
for
BALLISTIC RESEARCH LABORATORIES

510.84
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1952
v.2

[redacted]

LIST OF DRAWINGS

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127	Green Gate Chassis	
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138	6AS7 Cathode Follower ± 240V Supply	
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18 sht. 6 dwg.

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343	Arithmetic Stop Chassis	B
138	6AS7 Cathode Follower	
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171	Driver III Chassis	E
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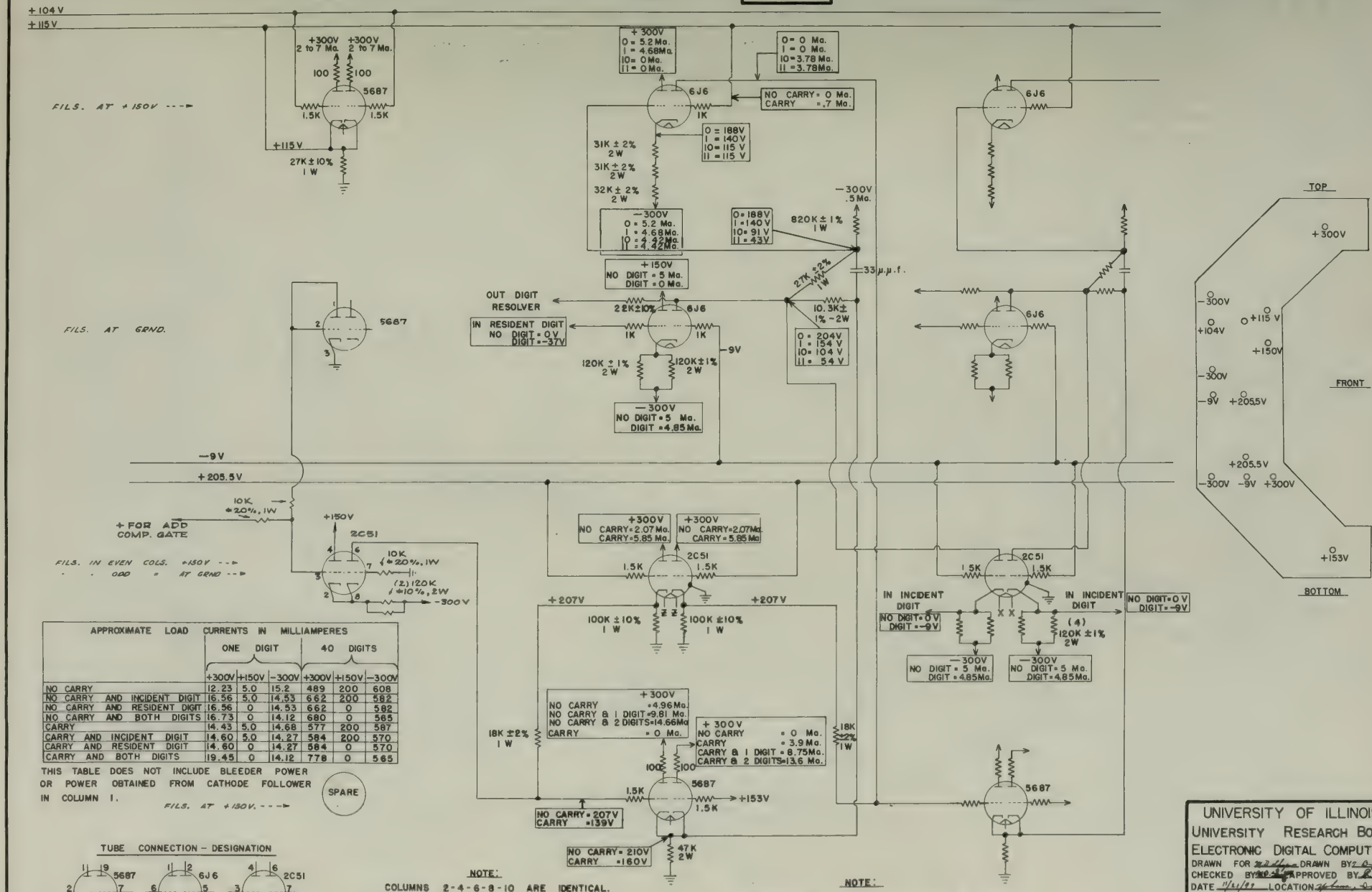
196	Video Amplifier and Williams Tube Control	W
370	WIV Clock	
261	Williams IB Pulse Cathode Follower	
209	Wiring-15 Type Perforator	
314	Yellow Gate Sequence	

XS-104-2

COLUMN 1 | COLUMN 2 | COLUMN 3


+104 V
+115 V
FILS. AT +150V ---►
+300V 2 to 7 Ma.
+300V 2 to 7 Ma.
100
100
5687
1.5K
1.5K
+115V
27K ± 10% 1 W
FILS. AT GRND.
5687
+300V 0 = 5.2 Ma. 1 = 4.68Ma. 10 = 0 Ma. 11 = 0 Ma.
0 = 0 Ma. 1 = 0 Ma. 10 = 3.78 Ma. 11 = 3.78Ma.
6J6
1K
NO CARRY = 0 Ma. CARRY = .7 Ma.
0 = 188V 1 = 140V 10 = 115 V 11 = 115 V
31K ± 2% 2W
31K ± 2% 2W
32K ± 2% 2W
−300V 0 = 5.2 Ma. 1 = 4.68Ma. 10 = 4.42Ma. 11 = 4.42Ma.
0 = 188V 1 = 140V 10 = 91 V 11 = 43V
820K ± 1% 1W
−300V .5Ma.
33 μ.μ.f.
+150V NO DIGIT = 5 Ma. DIGIT = 0 Ma.
27K ± 2% 1W
OUT DIGIT RESOLVER
22K ± 10%
6J6
10.3K ± 1% −2W
IN RESIDENT DIGIT NO DIGIT = 0V DIGIT = −37V
1K
1K
0 = 204 V 1 = 154 V 10 = 104 V 11 = 54 V
−9V
120K ± 1% 2W
120K ± 1% 2W
−300V NO DIGIT = 5 Ma. DIGIT = 4.85 Ma.
6J6
6J6
−9V
+205.5V
10K ± 20%, 1W
+ FOR ADD COMP. GATE
+150V
2C51
FILS. IN EVEN COLS. +150V --►
ODD = AT GRND --►
10K ± 20%, 1W
(2) 120K ± 10%, 2W
−300V
+300V NO CARRY = 2.07 Ma. CARRY = 5.85 Ma.
+300V NO CARRY = 2.07 Ma. CARRY = 5.85 Ma.
2C51
1.5K
1.5K
+207V
+207V
100K ± 10% 1W
100K ± 10% 1W
IN INCIDENT DIGIT NO DIGIT = 0V DIGIT = −9V
IN INCIDENT DIGIT
NO DIGIT = 0V DIGIT = −9V
(4) 120K ± 1% 2W
−300V NO DIGIT = 5 Ma. DIGIT = 4.85 Ma.
−300V NO DIGIT = 5 Ma. DIGIT = 4.85 Ma.
+300V NO CARRY = 4.96 Ma. NO CARRY & 1 DIGIT = 9.81 Ma. NO CARRY & 2 DIGITS = 14.66 Ma. CARRY = 0 Ma.
18K ± 2% 1W
+300V NO CARRY = 0 Ma. CARRY = 3.9 Ma. CARRY & 1 DIGIT = 8.75 Ma. CARRY & 2 DIGITS = 13.6 Ma.
18K ± 2% 1W
100
100
5687
1.5K
1.5K
+153V
NO CARRY = 207V CARRY = 139V
NO CARRY = 210V CARRY = 160V
47K 2W
5687
TOP
+300V
−300V
+104V
+115 V
+150V
−300V
FRONT
−9V
+205.5V
+205.5V
−300V −9V +300V
+153V
BOTTOM

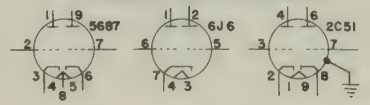
APPROXIMATE LOAD CURRENTS IN MILLIAMPERES	ONE DIGIT			40 DIGITS		
	+300V	+150V	−300V	+300V	+150V	−300V
NO CARRY	12.23	5.0	15.2	489	200	608
NO CARRY AND INCIDENT DIGIT	16.56	5.0	14.53	662	200	582
NO CARRY AND RESIDENT DIGIT	16.56	0	14.53	662	0	582
NO CARRY AND BOTH DIGITS	16.73	0	14.12	680	0	565
CARRY	14.43	5.0	14.68	577	200	587
CARRY AND INCIDENT DIGIT	14.60	5.0	14.27	584	200	570
CARRY AND RESIDENT DIGIT	14.60	0	14.27	584	0	570
CARRY AND BOTH DIGITS	19.45	0	14.12	778	0	565

THIS TABLE DOES NOT INCLUDE BLEEDER POWER OR POWER OBTAINED FROM CATHODE FOLLOWER IN COLUMN 1.

FILS. AT +150V. ---►

SPARE

TUBE CONNECTION – DESIGNATION



NOTE:

COLUMNS 2-4-6-8-10 ARE IDENTICAL.

COLUMNS 3-5-7-9-11 ARE IDENTICAL.

NOTE:

RESISTORS — ±20%, ½ WATT, UNLESS SPECIFIED.

CONDENSERS — ±20%, 600 V.

REVISED 10-24-51

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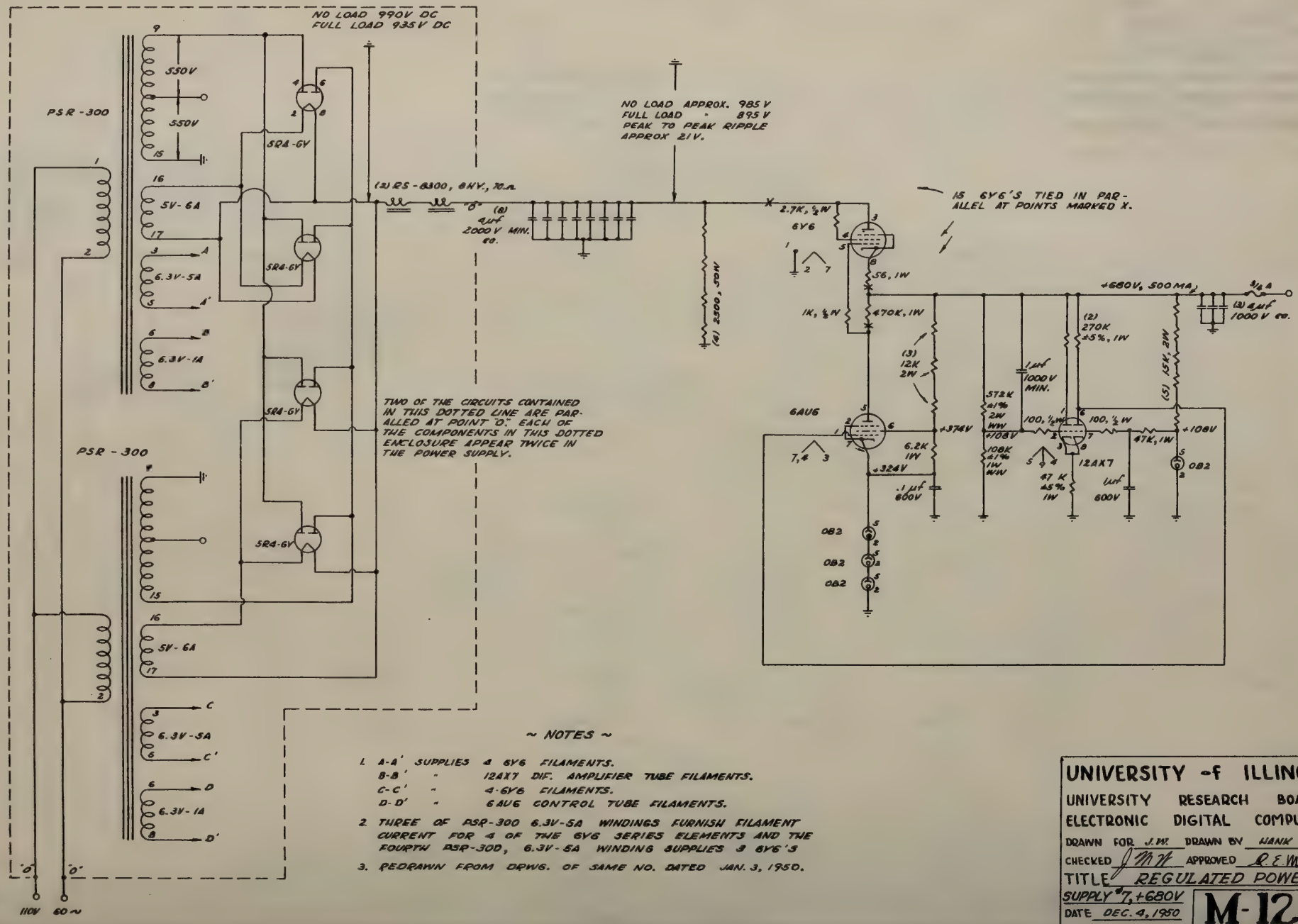
UNIVERSITY RESEARCH BOARD
ELECTRONIC DIGITAL COMPUTER
DRAWN FOR [illegible] DRAWN BY: [illegible]
CHECKED BY: [illegible] APPROVED BY: R. F. Mueller
DATE 11/21/51 LOCATION: Urbana, Ill.
TITLE ADDER CIRCUIT
DWG. NO. XS-104-2



~ NOTES ~

1. A-A' SUPPLIES 4 6V6 FILAMENTS.
   B-B' " 12AX7 DIF. AMPLIFIER TUBE FILAMENTS.
   C-C' " 4-6V6 FILAMENTS.
   D-D' " 6AU6 CONTROL TUBE FILAMENTS.
2. THREE OF PSR-300 6.3V-5A WINDINGS FURNISH FILAMENT CURRENT FOR 4 OF THE 6V6 SERIES ELEMENTS AND THE FOURTH PSR-300, 6.3V-5A WINDING SUPPLIES 3 6V6'S
3. REDRAWN FROM DRWG. OF SAME NO. DATED JAN. 3, 1950.

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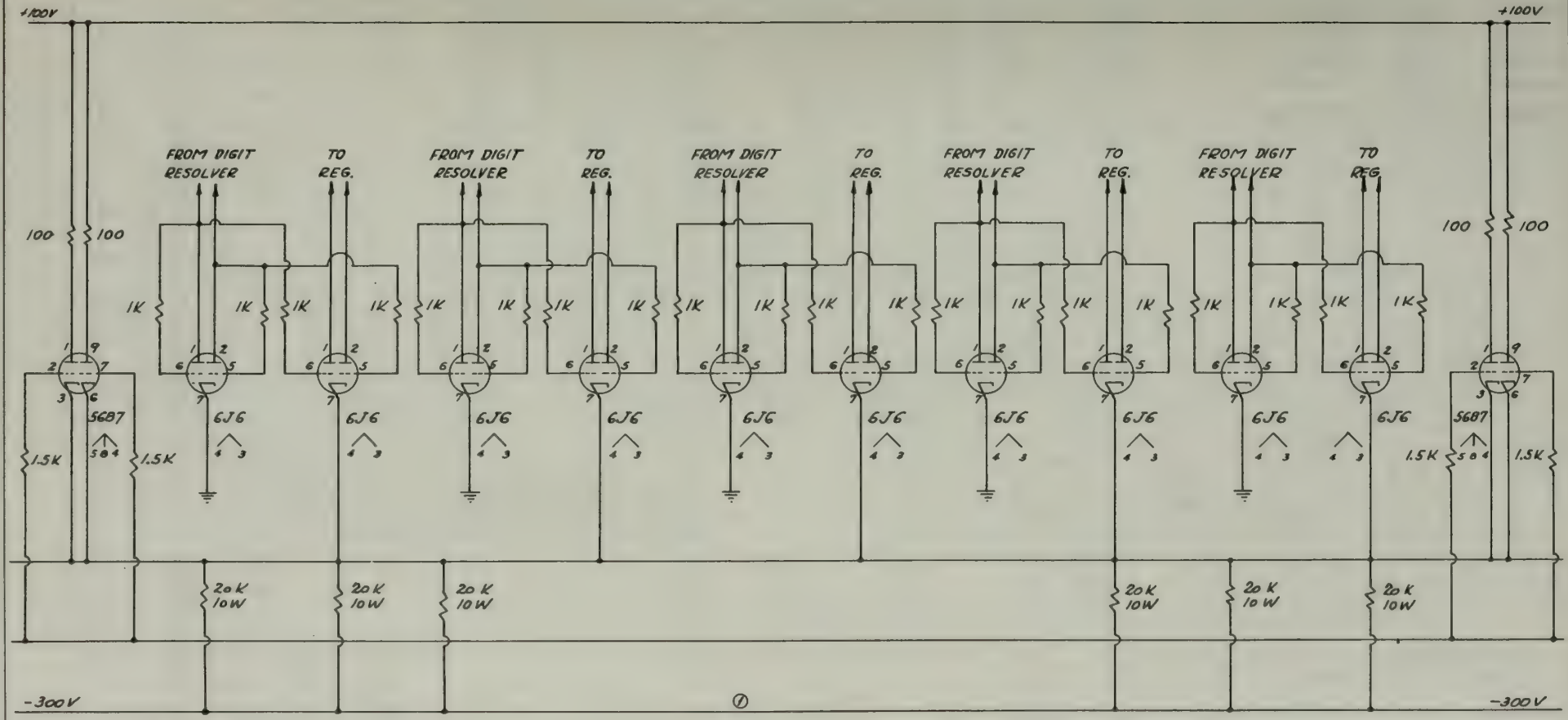
ELECTRONIC DIGITAL COMPUTER
DRAWN FOR J.W. DRAWN BY HANK W.
CHECKED J.M.M. APPROVED R.E. Meagher
TITLE REGULATED POWER SUPPLY #7, +680V
DATE DEC. 4, 1950
M-126



~ NOTE ~
ALL RESISTORS NOT SPECIFIED ARE ½W, ± 20%.
ALL FILAMENTS AT GROUND.

REDRAWN FROM "DRWG. #127 - 1-5-50."

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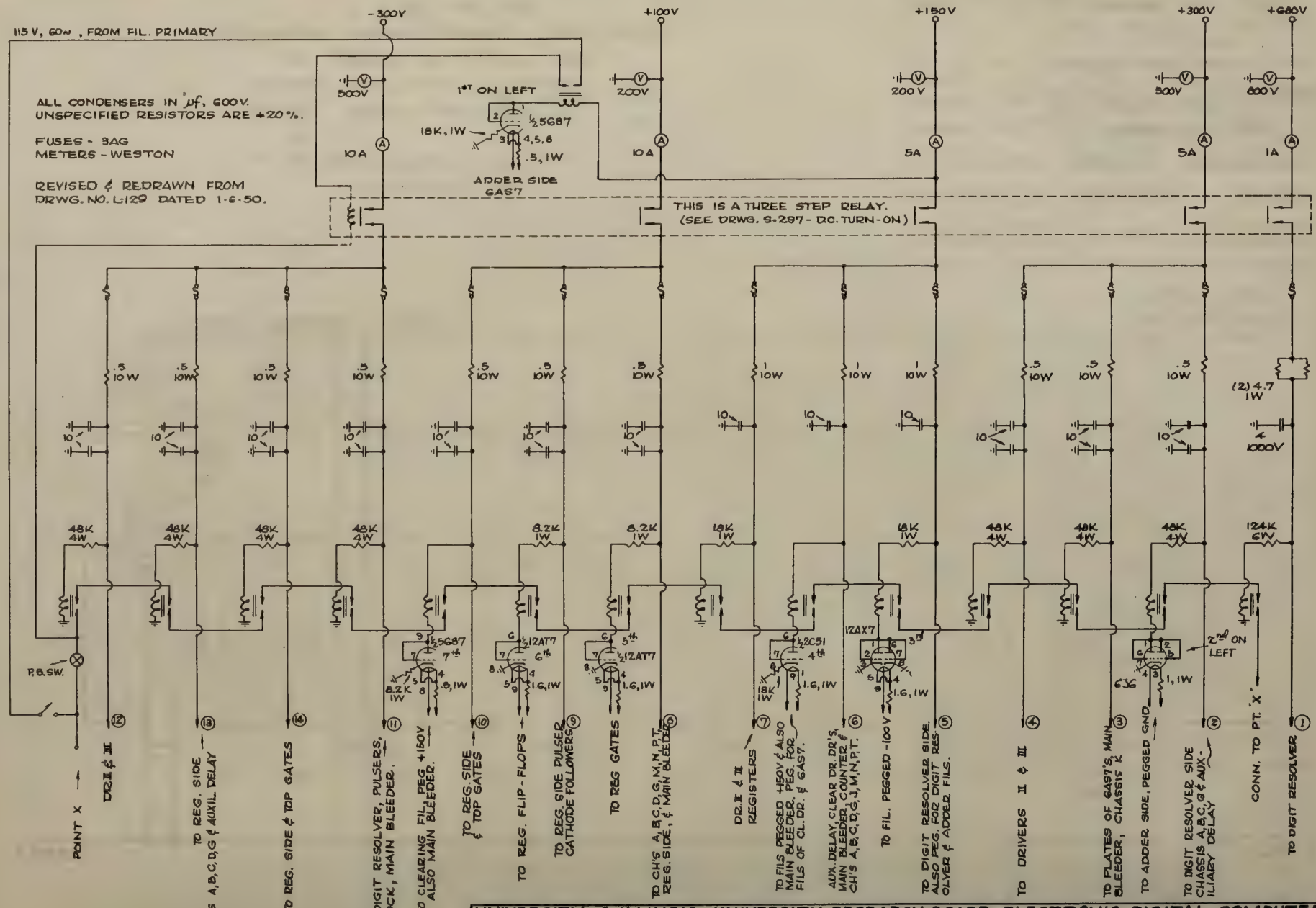
ELECTRONIC DIGITAL COMPUTER
DRAWN FOR W. Jones DRAWN BY H.M.W
CHECKED BY W. Jones APPROVED BY R.E. Meagher
TITLE GREEN GATE CHASSIS
DATE 8-11-50
M-127



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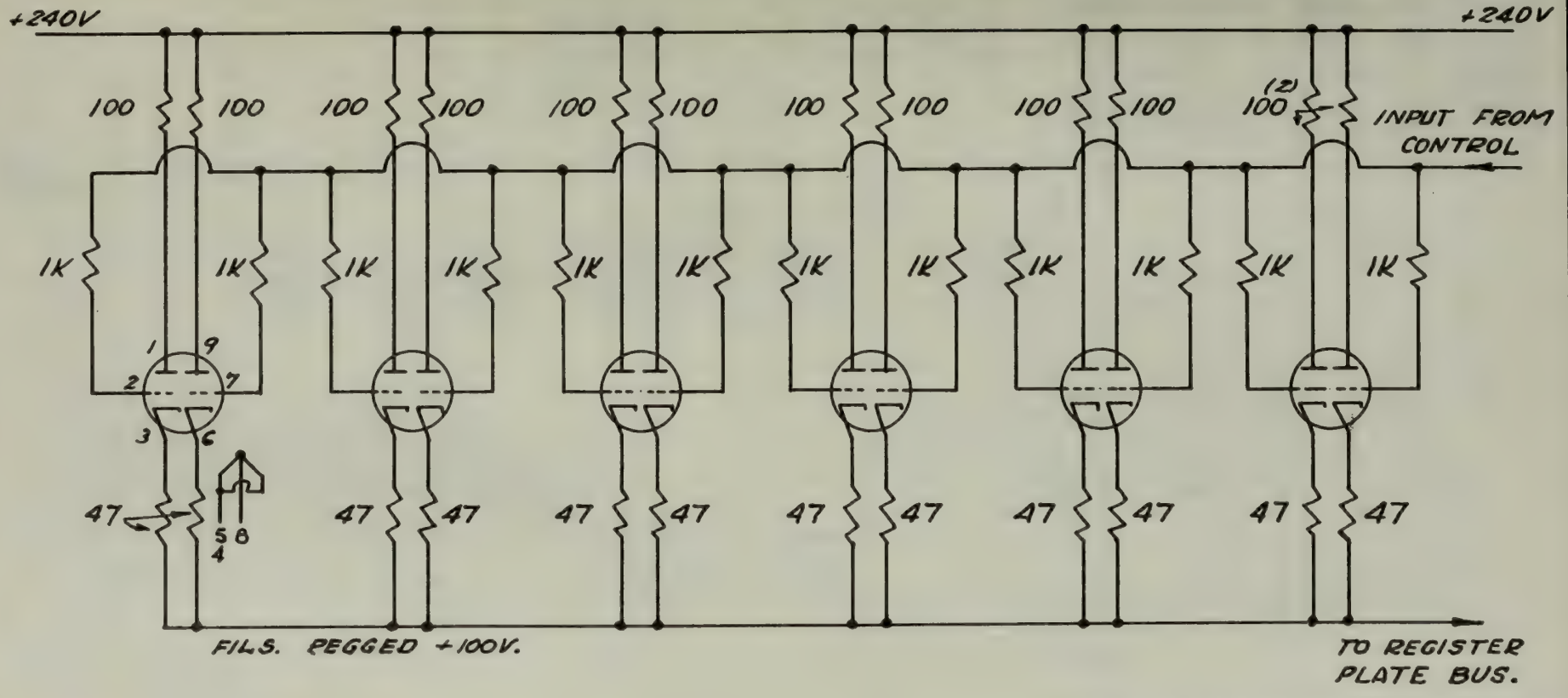
FOR WEJ BY HMW CHECKED W.E.J. APPROVED R.E. Meagher DATE 11-13-51

TITLE – D. C. CONTROL & DISTRIBUTION FOR ORDVAC

M-129



~NOTES~

1. ALL RESISTORS ARE ½ W ℄ ±
2. ALL TUBES ARE 5687'S.
3. ALL FIL. CONN. TO 6.3V AS SHOWN ON FIRST TUBE.

REDRAWN FROM DRWG. #130 DATED 1-9-50 BY T.B.

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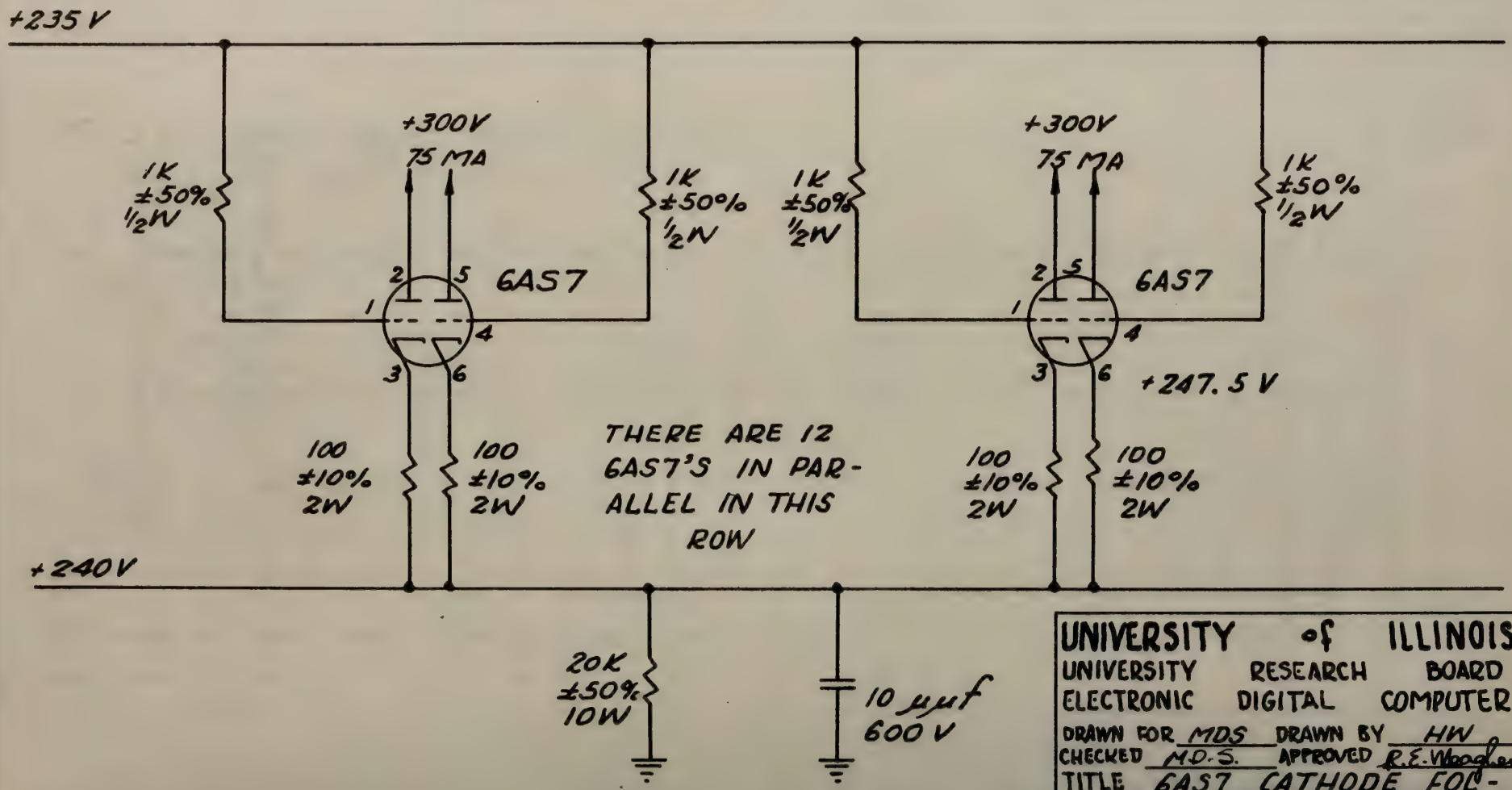
ELECTRONIC DIGITAL COMPUTER
DRAWN FOR W.J DRAWN BY HW
CHECKED W. J. APPROVED R. E. Meagher
TITLE CLEAR DRIVER
DATE 8-11-50 DRWG. Nº 130

REDRAWN FROM DRWG. N° 138 DATED 3-7-50



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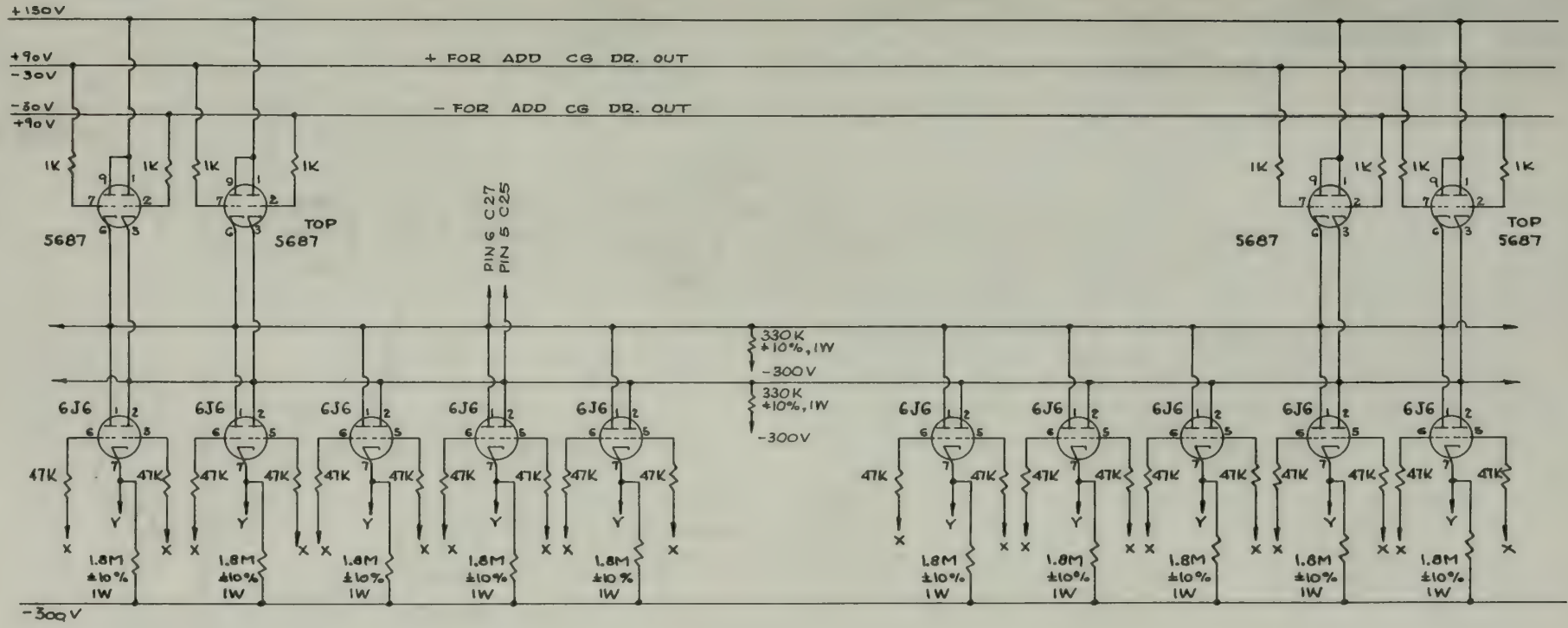
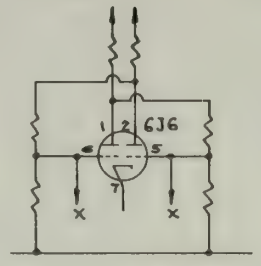
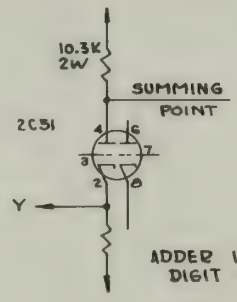
DRAWN FOR MDS DRAWN BY HW
CHECKED M.D.S. APPROVED R.E. Woodley
TITLE 6AS7 CATHODE FOL-LOWER, ±240 V SUPPLY
DATE 8-14-50 DRWG. N° 138





REGISTER TOGGLE



ADDER INCIDENT DIGIT GATE

~NOTES~

1. RESISTORS NOT SPECIFIED ARE ½W, ± 20%.
2. REDRAWN FROM DRWG. No. 155 DATED 4·12·50.
3. ALL FILS. AT GROUND.

★REVISED 1·3·52

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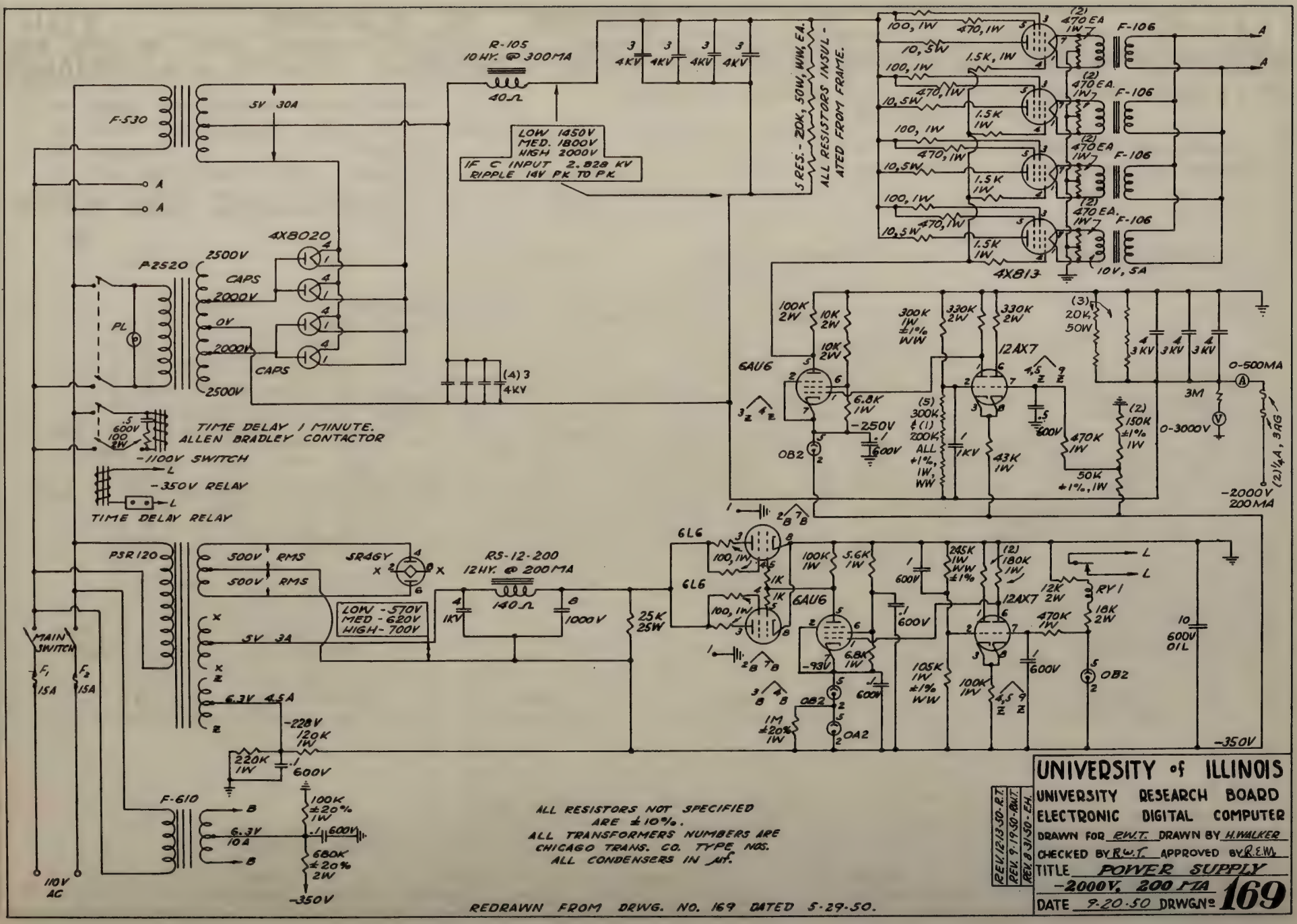
ELECTRONIC DIGITAL COMPUTER
DRAWN FOR M.D.S. DRAWN BY H.W.
CHECKED BY M.D.S. APPROVED BY R.E. Meagher
TITLE COMPLEMENT GATE
DATE 8·14·50

M-155



ALL RESISTORS NOT SPECIFIED ARE ±10%.
ALL TRANSFORMERS NUMBERS ARE CHICAGO TRANS. CO. TYPE NOS.
ALL CONDENSERS IN μf.

REDRAWN FROM DRWG. NO. 169 DATED 5-29-50.

REV. 12-13-50 - R.T.
REV. 9-19-50 - R.W.T.
REV. 8-31-50 - E.H.

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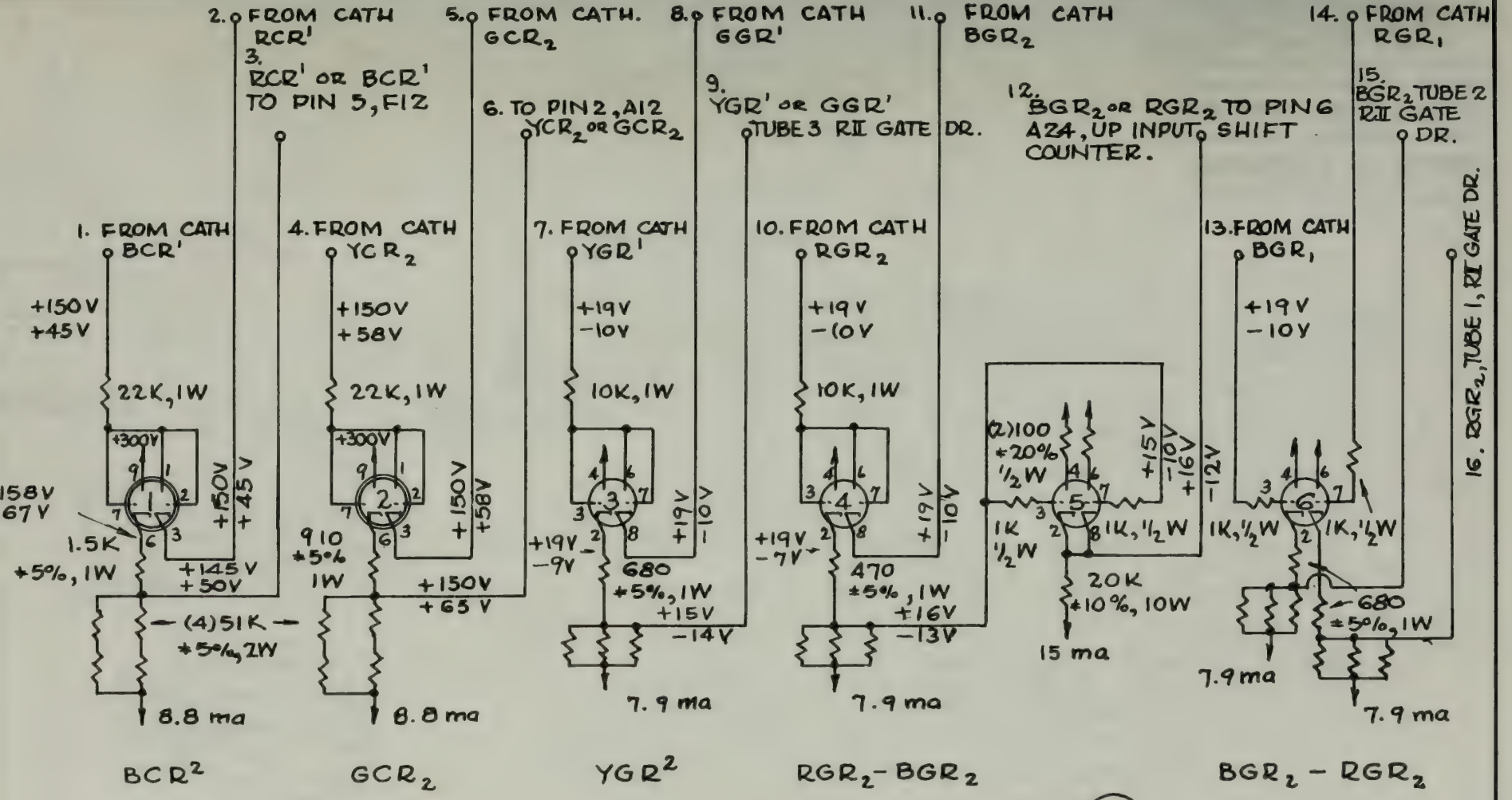
ELECTRONIC DIGITAL COMPUTER
DRAWN FOR R.W.T. DRAWN BY H.WALKER
CHECKED BY R.W.T. APPROVED BY R.E.M.
TITLE POWER SUPPLY -2000V, 200 MA
DATE 9-20-50 DRWG.NO. 169



BCR^2 GCR_2 YGR^2 $RGR_2 - BGR_2$ $BGR_2 - RGR_2$

WHEN NOT SPECIFIED:

1. UP VOLTAGES ARE +100V.
2. DOWN " " −300V.
3. CATH. RESISTORS ARE 120K, ±5%, 2W.
4. GRID RESISTORS ARE ±10%.

◯ INDICATES 5687

◯ INDICATES 2C51

E

- FILAMENTS OF V1 & V2 AT +100V.
- ALL OTHER FILAMENTS AT GND.
- REVISED 11-14-51.
- REVISED & REDRAWN FROM DRWG OF SAME NO. DATED 8-3-50

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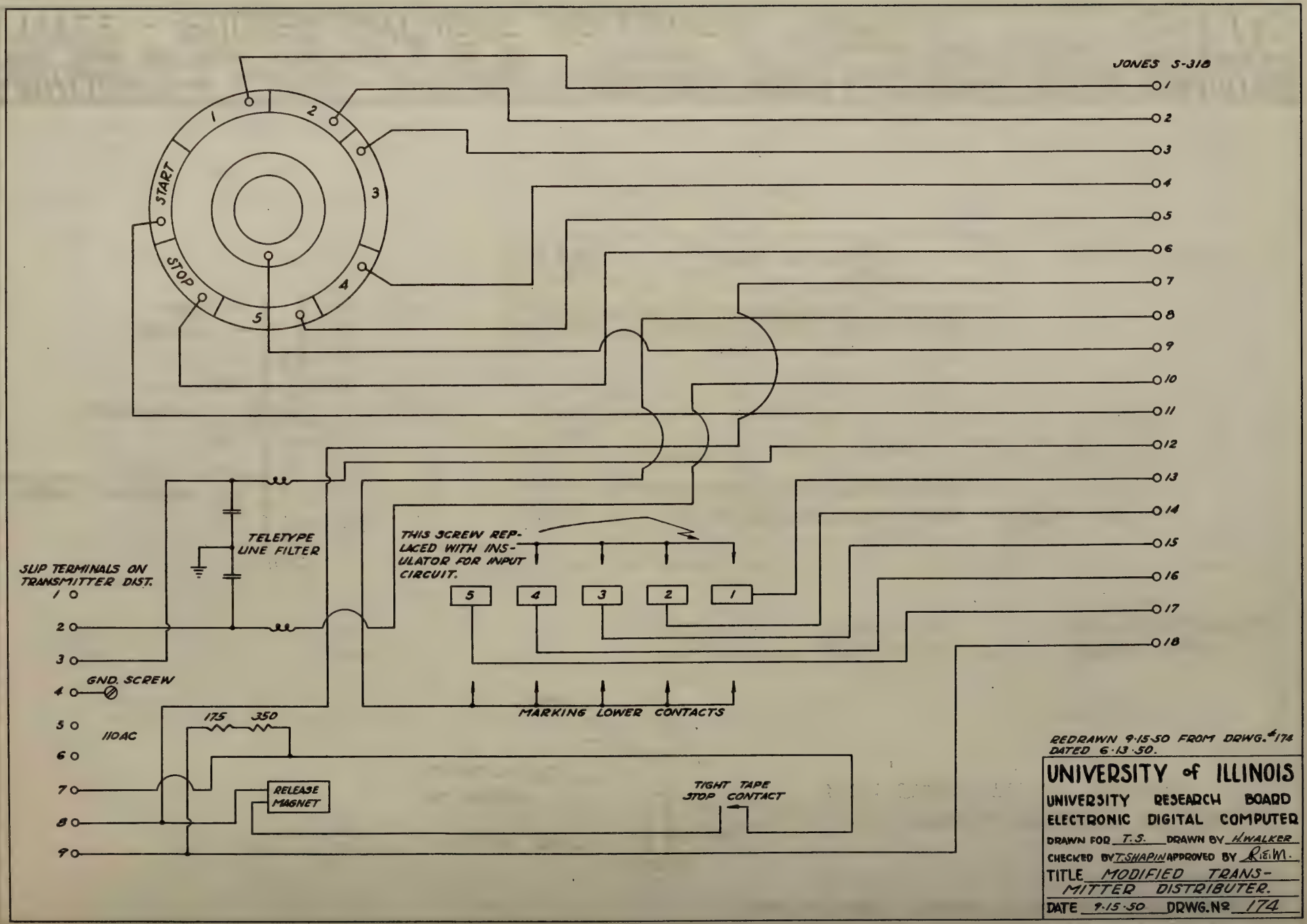
FOR JPN BY HMW CHECKED JMash APPROVED R.E. Meagher DATE 6-19-51

TITLE ~ DRIVER III CHASSIS

S-171



REDRAWN 9-15-50 FROM DRWG. #174 DATED 6-13-50.

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ELECTRONIC DIGITAL COMPUTER

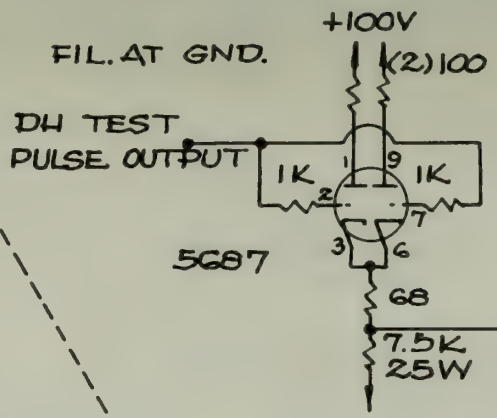
DRAWN FOR T.S. DRAWN BY H.WALKER

CHECKED BY T.SHAPIN APPROVED BY R.E.M.

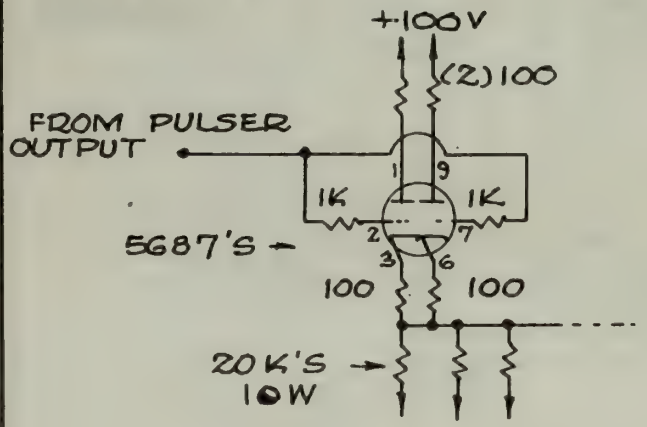
TITLE MODIFIED TRANSMITTER DISTRIBUTER.

DATE 9-15-50 DRWG. NO. 174

PLATE & GRID RESISISTORS ARE ±20%, ½W.



ISOLATION CATHODE FOLLOWER FOR DASH TEST PULSE.



ALL 1K & 100 Ω RESISTORS ARE ± 20%, ½W.
ALL FILAMENTS AT GROUND.

PULSE	5687'S	20K RESISTORS
DOT	3	2
DH TEST	22	50
DH. END	10	20

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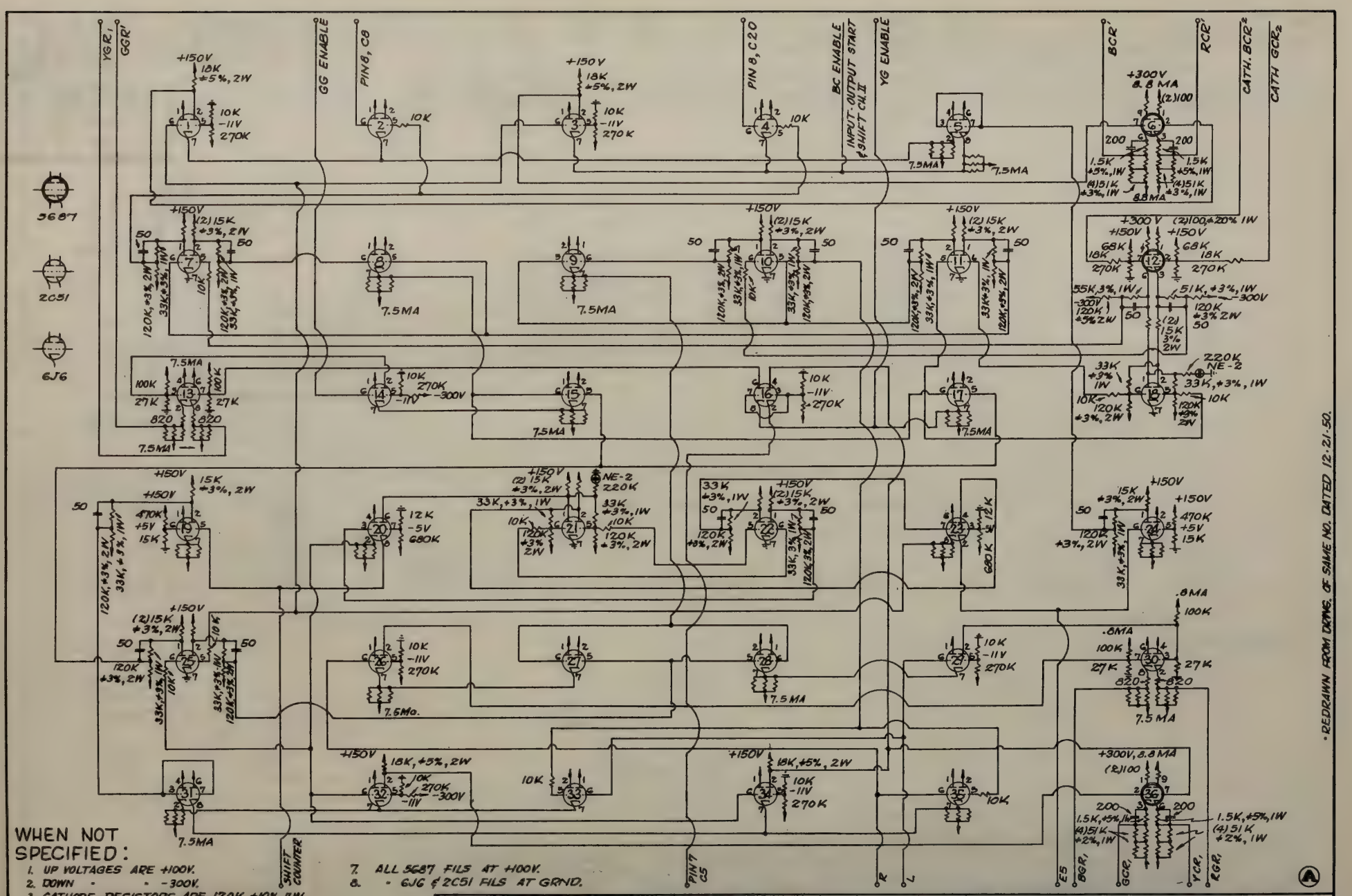
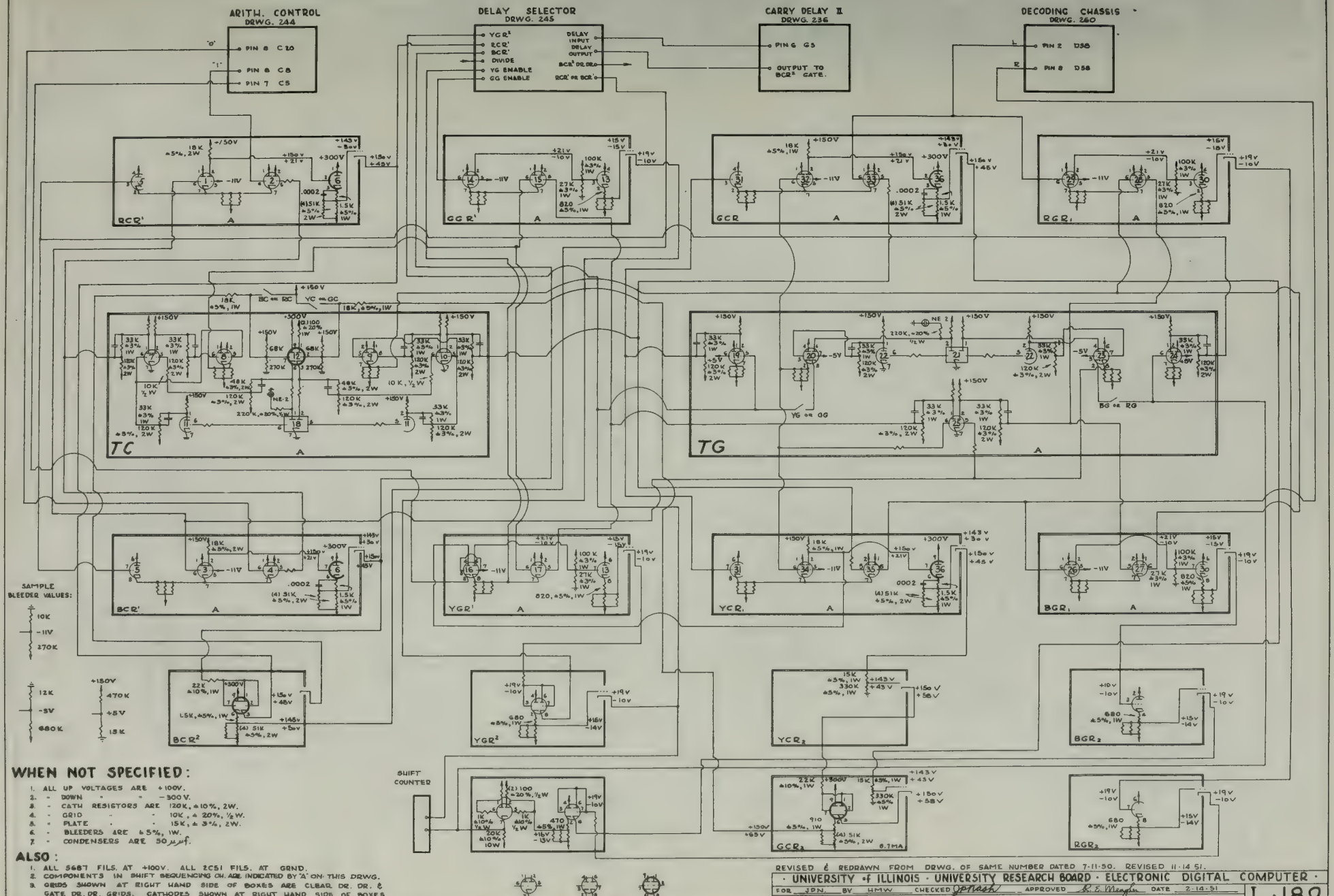
FOR JMW BY HMW CHECKED J. M. W. APPROVED R. E. Meagher DATE 11·20·51 S·176

TITLE ~ PULSER CATHODE FOLLOWER CHASSIS


YG R1
GGR1
GG ENABLE
PIN 8, C8
PIN 8, C20
BC ENABLE
INPUT-OUTPUT START
SHIFT CK. II
YG ENABLE
BCR1
RCR1
CATH. BCR2
CATH. GCR2
5687
2C51
6J6
+150V
18K ±5%, 2W
10K
-11V
270K
7.5MA
(2)15K ±3%, 2W
50
120K, ±3%, 2W
33K, ±3%, 1W
10K
+300V
8.8 MA
(2)100
200
1.5K ±5%, 1W
(4)51K ±3%, 1W
68K
18K
270K
55K, 3%, 1W
-300V
120K, ±3% 2W
51K, ±3%, 1W
(2)15K 3% 2W
220K
NE-2
33K, ±3%, 1W
10K
820
27K
100K
.8MA
15K ±3%, 2W
470K
+5V
15K
12K
-5V
680K
SHIFT COUNTER
PIN 7 C5
R
L
E5
BGR1
GCR1
YCR1
EGR1
WHEN NOT SPECIFIED:
1. UP VOLTAGES ARE +100V.
2. DOWN - - -300V.
3. CATHODE RESISTORS ARE 120K, ±10%, 2W.
4. BLEEDERS ARE ±5%, 1W.
5. OTHER RESISTORS ARE ±20%, ½W.
6. CONDENSERS ARE IN μμf.
7. ALL 5687 FILS AT +100V.
8. - 6J6 & 2C51 FILS AT GRND.
• REDRAWN FROM DRWG. OF SAME NO. DATED 12-21-50.
A
UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER
FOR WEJ BY LMW CHECKED RLR APPROVED R. E. Meagher DATE 12-7-51
TITLE - SHIFT SEQUENCING CHASSIS
M-181



WHEN NOT SPECIFIED:

1. ALL UP VOLTAGES ARE +100V.
2. " DOWN " " −300 V.
3. " CATH RESISTORS ARE 120K, ±10%, 2W.
4. " GRID " " 10K, ± 20%, ½W.
5. " PLATE " " 15K, ± 3%, 2W.
6. " BLEEDERS ARE ±5%, 1W.
7. " CONDENSERS ARE 50 μμf.

ALSO:

1. ALL 5687 FILS. AT +100V. ALL 2C51 FILS. AT GRND.
2. COMPONENTS IN SHIFT SEQUENCING CH. ARE INDICATED BY 'A' ON THIS DRWG.
3. GRIDS SHOWN AT RIGHT HAND SIDE OF BOXES ARE CLEAR DR. DR. & GATE DR. DR. GRIDS. CATHODES SHOWN AT RIGHT HAND SIDE OF BOXES ARE CLEAR AND GATE CATHODES IN REGISTERS.

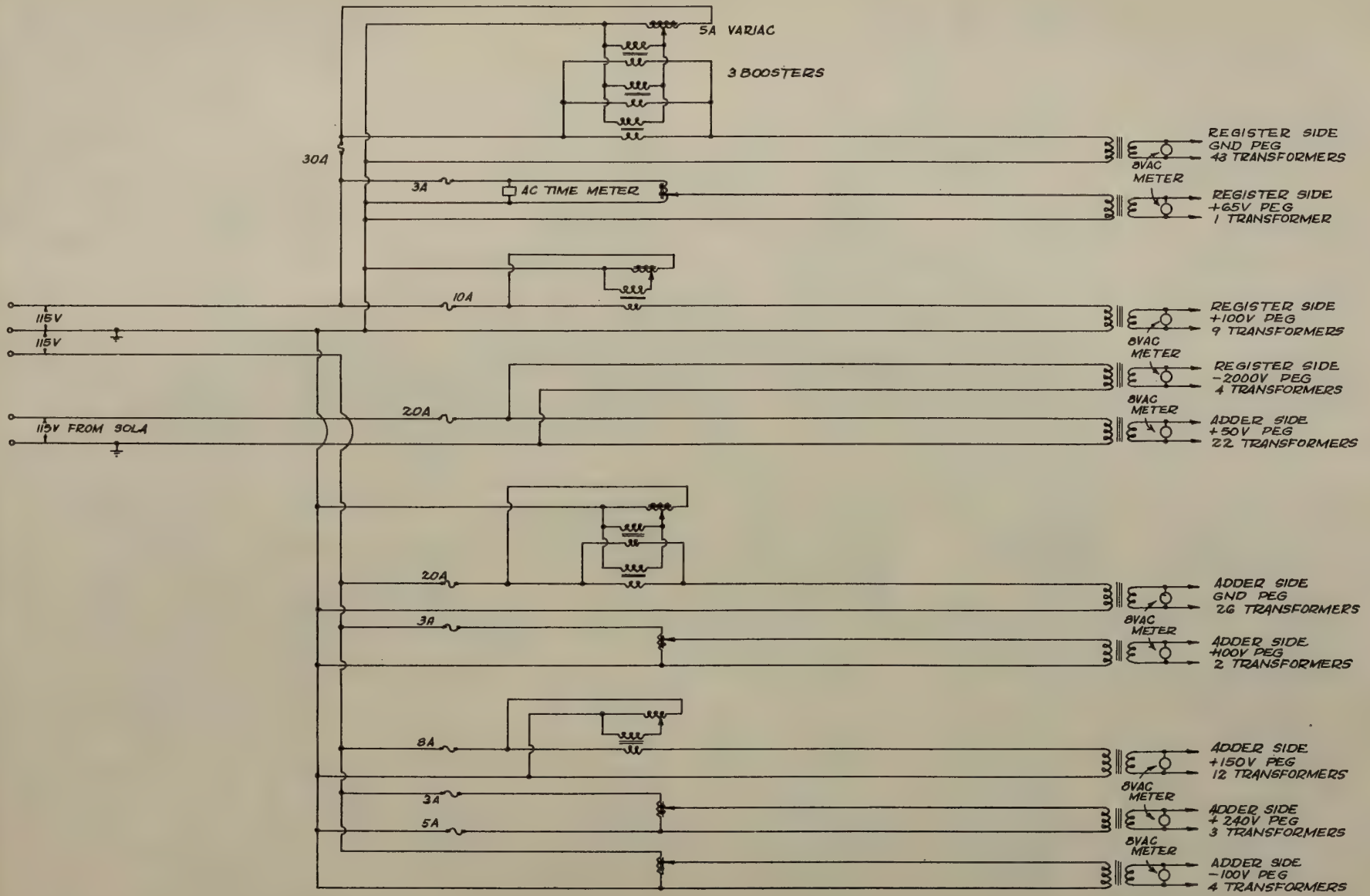
REVISED & REDRAWN FROM DRWG. OF SAME NUMBER DATED 7-11-50. REVISED 11-14-51.

· UNIVERSITY · OF ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER ·

FOR JDN. BY HMW CHECKED Jonash APPROVED R. E. Meagher DATE 2-14-51

TITLE SHIFT CONTROL

L-189



~ NOTES ~

1. ALL 6.3V FILAMENT TRANSFORMERS ARE THORDARSON D161937.
2. ALL VARIACS GENERAL RADIO TYPE V-5MT.

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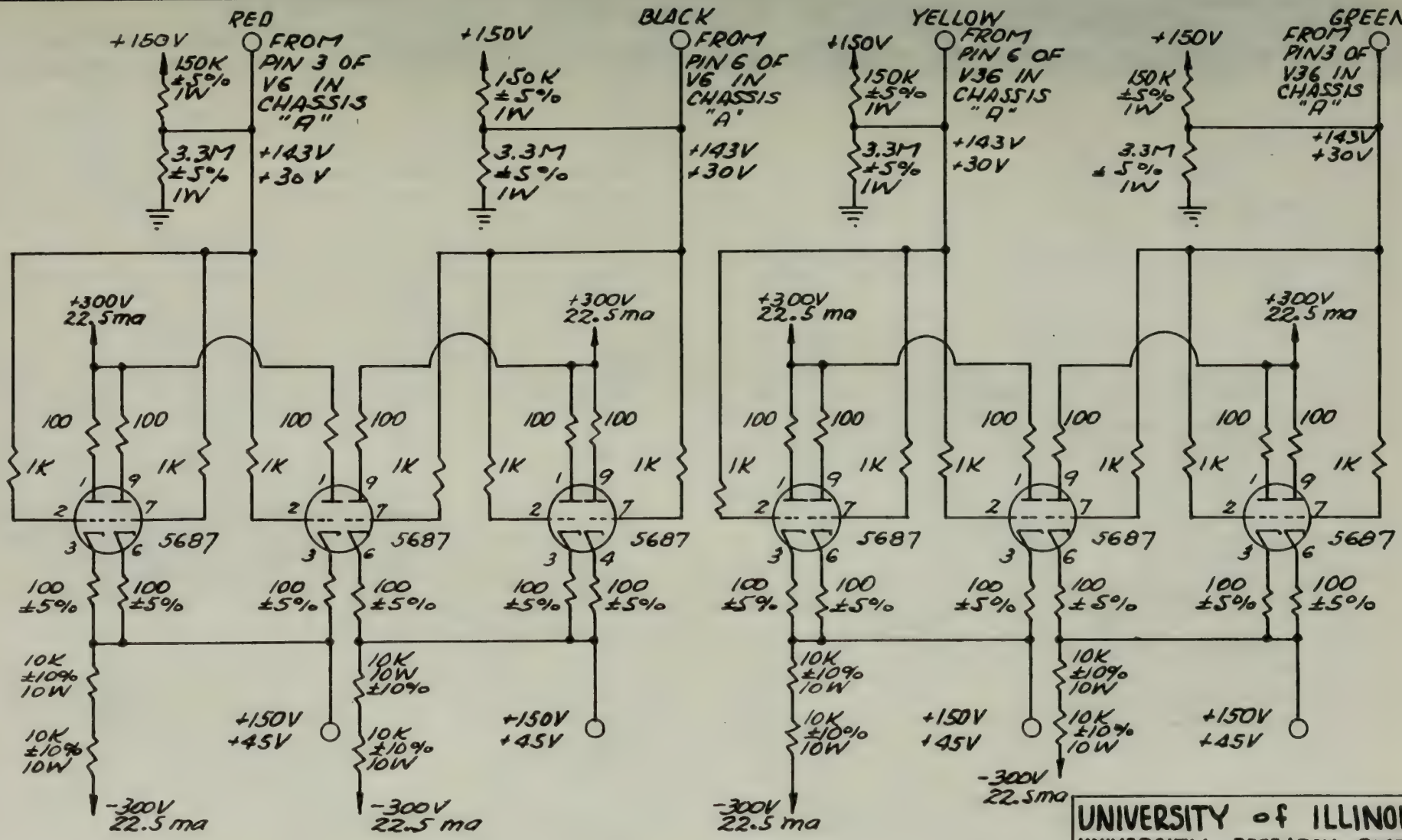
FOR WEJ BY HMW CHECKED W. JONES APPROVED R. E. Meagher. DATE 3-8-52

TITLE ~ A.C. DISTRIBUTION FOR FILAMENT TRANSFORMERS

M-190



~ NOTES ~

1. UNLESS OTHERWISE SPECIFIED RESISTORS ARE ½W, ±20%.
2. FILAMENTS AT +100V.

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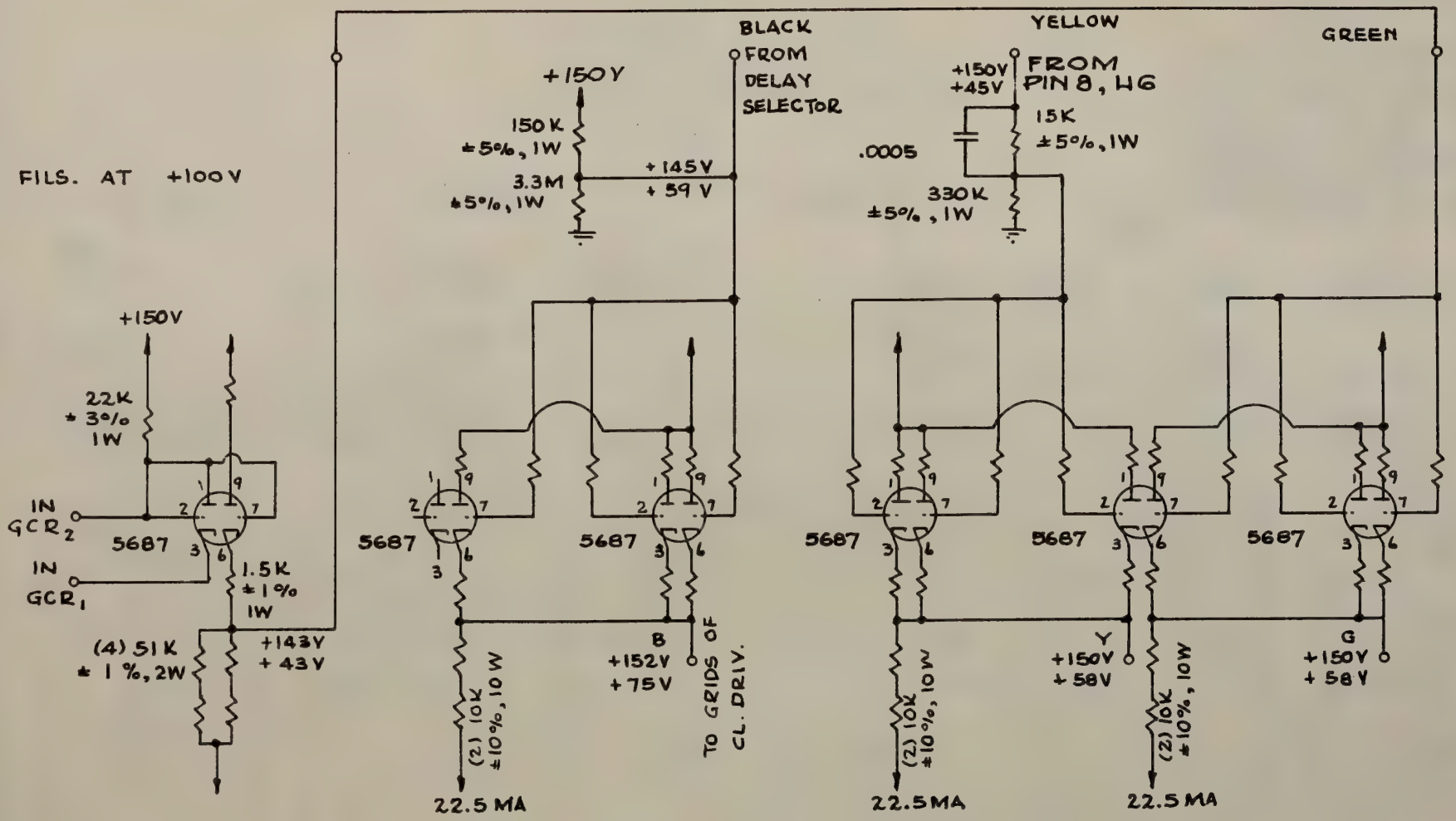
UNIVERSITY RESEARCH BOARD
ELECTRONIC DIGITAL COMPUTER

DRAWN FOR J.P.N. DRAWN BY HMW
CHECKED JPN APPROVED R.E.M.

TITLE CLEAR DRIVER
DRIVER R I

DATE 7.21.50 DRWG. No. 192



WHEN NOT SPECIFIED

1. UP VOLTAGES ARE +300V.
2. DOWN " " -300V.
3. PLATE RESISTORS ARE 100, ± 20%, 1/2W.
4. GRID " " 1K, ± 20%, 1/2W.
5. CATH. " " 100, ± 5%, 1/2W.

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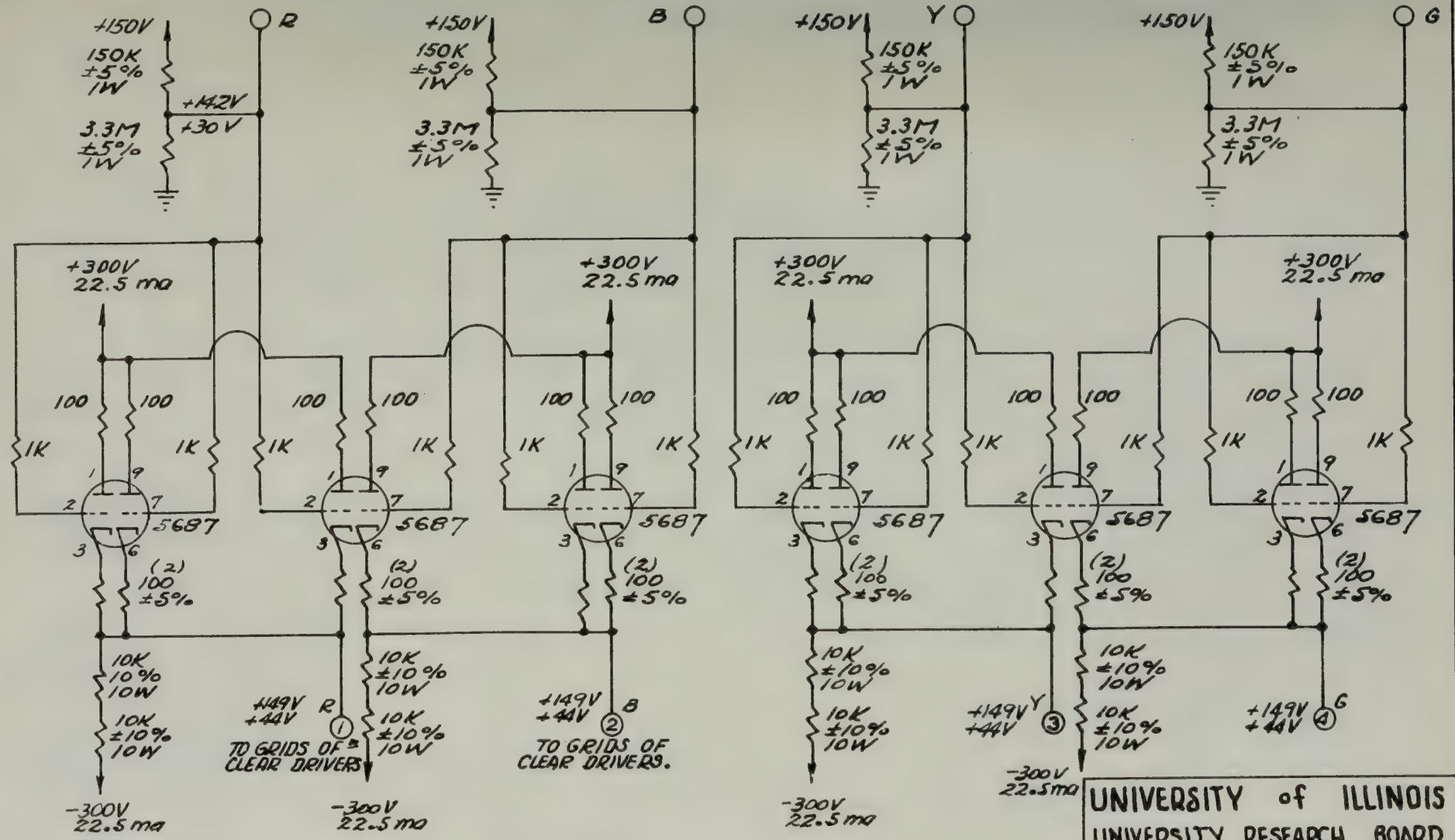
FOR ELH BY HMW CHECKED ELH APPROVED R. E. Meagher DATE 4-18-51

TITLE · CLEAR DR. DR. RII

S-193



NOTES

1. FILAMENTS AT +100V.
2. UNLESS OTHERWISE SPECIFIED, RESISTORS ARE ½ W, ± 20 %.

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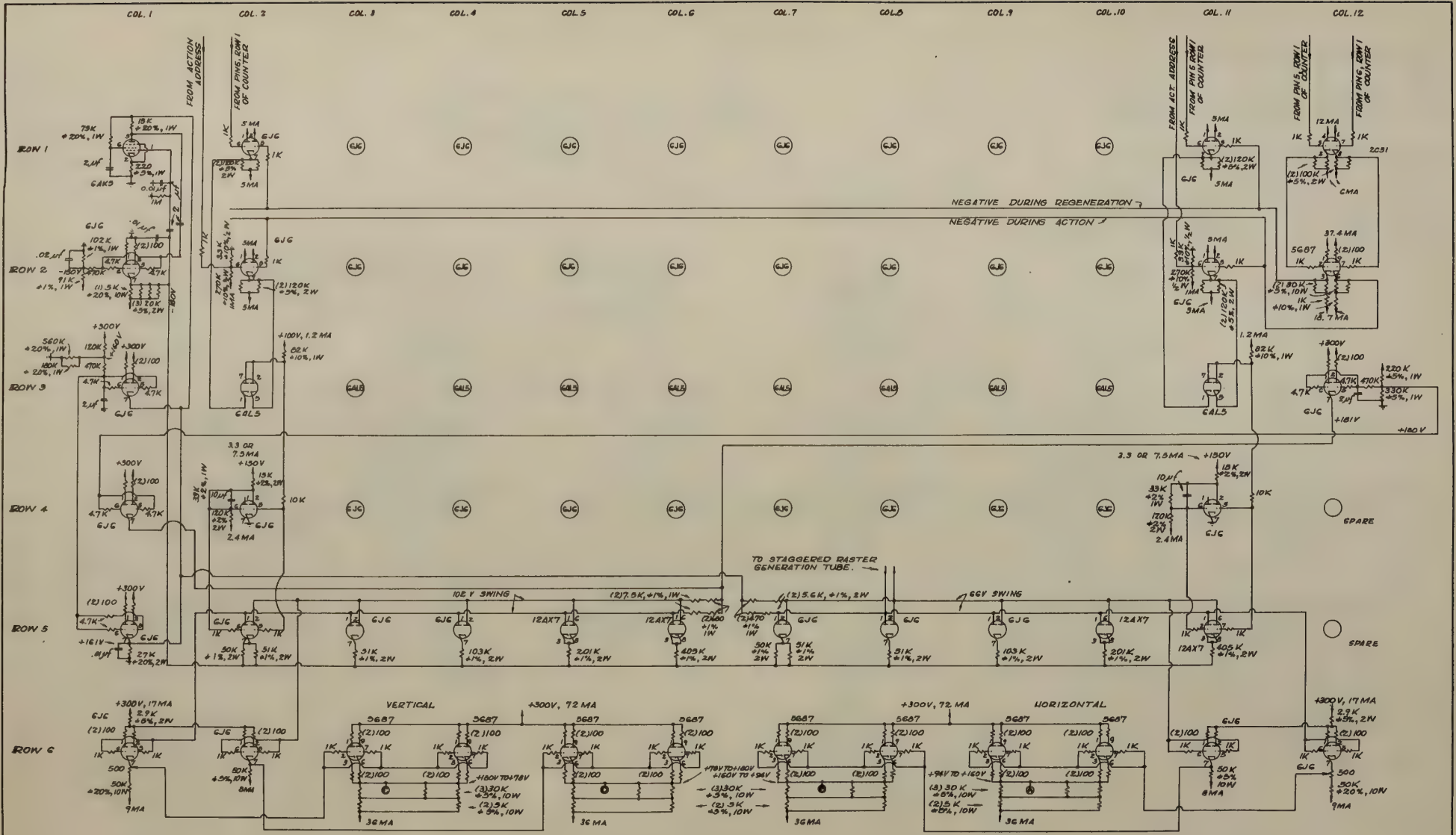
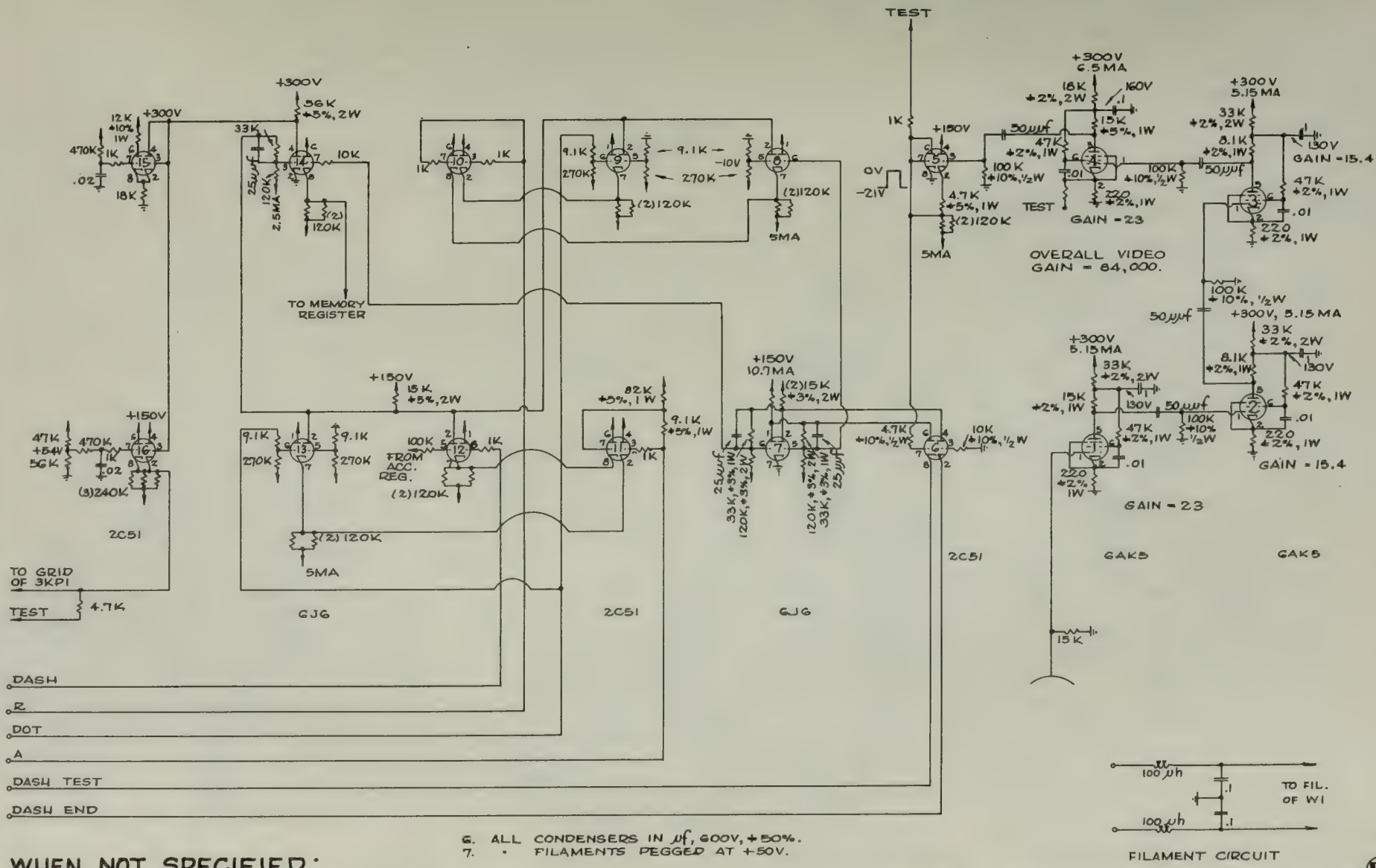
ELECTRONIC DIGITAL COMPUTER

DRAWN FOR REM DRAWN BY H.M.W.
CHECKED R.E.M. APPROVED R.E.M.
TITLE CLEAR DR. DR. R III
DATE 7-18-50 DRWG. No. 194


COL. 1
COL. 2
COL. 3
COL. 4
COL. 5
COL. 6
COL. 7
COL. 8
COL. 9
COL. 10
COL. 11
COL. 12
ROW 1
ROW 2
ROW 3
ROW 4
ROW 5
ROW 6
FROM ACTION ADDRESS
FROM PIN 6, ROW I OF COUNTER
FROM ACT. ADDRESS
FROM PIN 5 ROW I OF COUNTER
FROM PIN 5, ROW I OF COUNTER
FROM PIN 6, ROW I OF COUNTER
NEGATIVE DURING REGENERATION
NEGATIVE DURING ACTION
TO STAGGERED RASTER GENERATION TUBE.
102 V SWING
66V SWING
SPARE
SPARE
VERTICAL
HORIZONTAL
+300V, 72 MA
+300V, 72 MA
+300V, 17 MA
+300V, 17 MA
+78V TO +180V
+160V TO +94V
+94V TO +160V
+78V TO +180V
+180V
+161V
+100V, 1.2 MA
2.3 OR 7.5 MA
3.3 OR 7.5 MA
2.4 MA
1.2 MA
12 MA
37.4 MA
18.7 MA
9 MA
8 MA
36 MA
36 MA
36 MA
36 MA
GJC
GAL5
6AK3
5687
12AX7
2C51
5MA
GJC
GAL5
5687
12AX7
GJC
GAL5
5MA
GJC
GAL5
5MA
GJC
GAL5
5MA
GJC
GAL5
12MA
GJC
GAL5
5687
GJC
GAL5
GJC
GAL5
GJC
GAL5



6. ALL CONDENSERS IN μf, 600V, ±50%.
7. " FILAMENTS PEGGED AT +50V.

WHEN NOT SPECIFIED:

1. ALL 1K, 4.7K, 10K, 100K, 470K RES'S ARE ±20%, ½W.
2. " BLEEDER RESISTORS ARE ±3%, 1W.
3. " CATHODE " " ±5%, 2W.
4. " UP VOLTAGES ARE +100V.
5. " DOWN " " −300V.

• REVISED & REDRAWN FROM DRWG. OF SAME Nº DATED 8·2·50.

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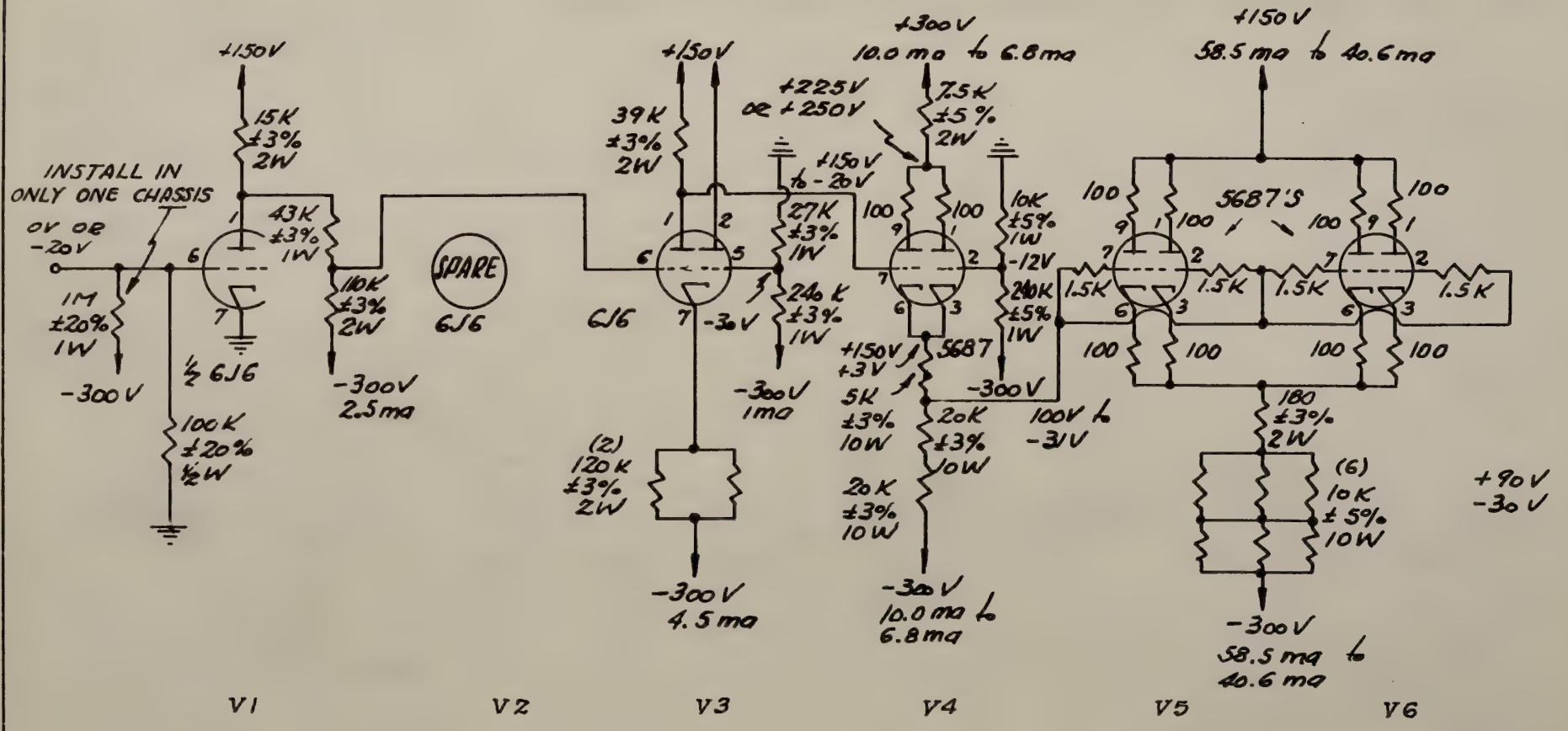
FOR JMW BY HMW CHECKED J.M.W. APPROVED R. E. Meagher DATE 12·6·51

TITLE ~ VIDEO AMPLIFIER & WILLIAMS TUBE CONTROL #3

M-196



~ NOTES ~

1. FILAMENTS OF V1 & V3 AT GRND.
2. " " V4, V5, V6 AT +65V.
3. UNLESS OTHERWISE SPECIFIED RESISTORS ARE ½W, ± 20%.
4. MAKE TWO PER ARITHMETIC UNIT.

K

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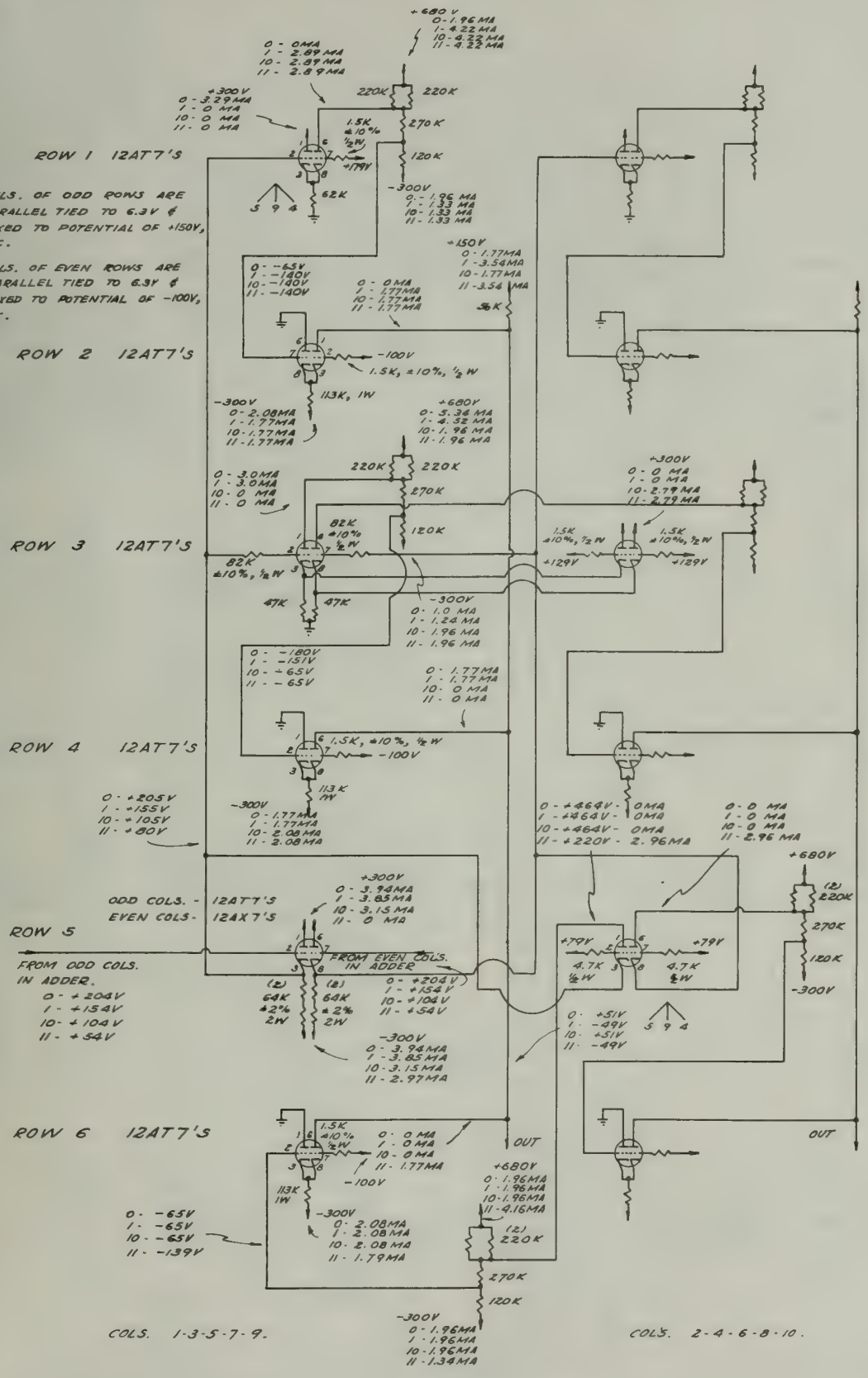
ELECTRONIC DIGITAL COMPUTER

DRAWN FOR REM DRAWN BY HMW

CHECKED R.E.M. APPROVED R.E. Meagher

TITLE COMPLEMENT GATE DRIVER

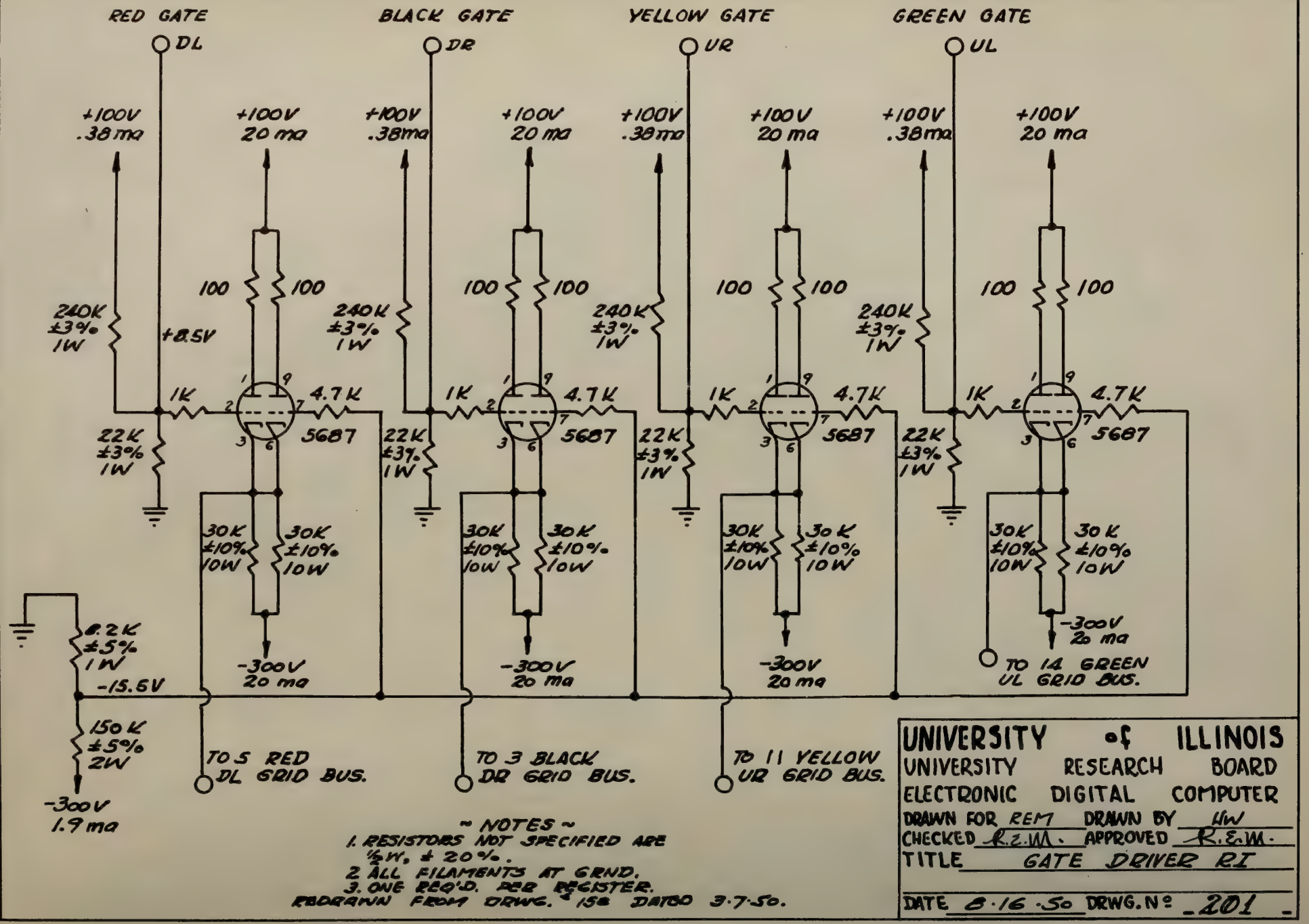
DATE 8·3·50 DRWG. N° 198


ROW 1 12AT7'S
FILS. OF ODD ROWS ARE PARALLEL TIED TO 6.3V & FIXED TO POTENTIAL OF +150V, DC.
FILS. OF EVEN ROWS ARE PARALLEL TIED TO 6.3V & FIXED TO POTENTIAL OF -100V, DC.
ROW 2 12AT7'S
ROW 3 12AT7'S
ROW 4 12AT7'S
ROW 5
ODD COLS. - 12AT7'S
EVEN COLS - 12AX7'S
ROW 6 12AT7'S
FROM ODD COLS. IN ADDER.
FROM EVEN COLS. IN ADDER
OUT
OUT
COLS. 1-3-5-7-9.
COLS. 2-4-6-8-10.

ALL RESISTORS NOT SPECIFIED ARE 2W, ±2%.

REDRAWN FROM DRWG. OF SAME NO. DATED 8-10-50.

DRAWN FOR M123	UNIVERSITY of ILLINOIS
DRAWN BY HANK WALKER	UNIVERSITY RESEARCH BOARD
CHECKED	ELECTRONIC DIGITAL COMPUTER
APPROVED	
DATE NOV 28, 1950	
TITLE DIGIT RESOLVER	M-200



~ NOTES ~

1. RESISTORS NOT SPECIFIED ARE ½W, ± 20%.
2. ALL FILAMENTS AT GRND.
3. ONE REQ'D. PER REGISTER.

REDRAWN FROM DRWG. 158 DATED 3-7-50.

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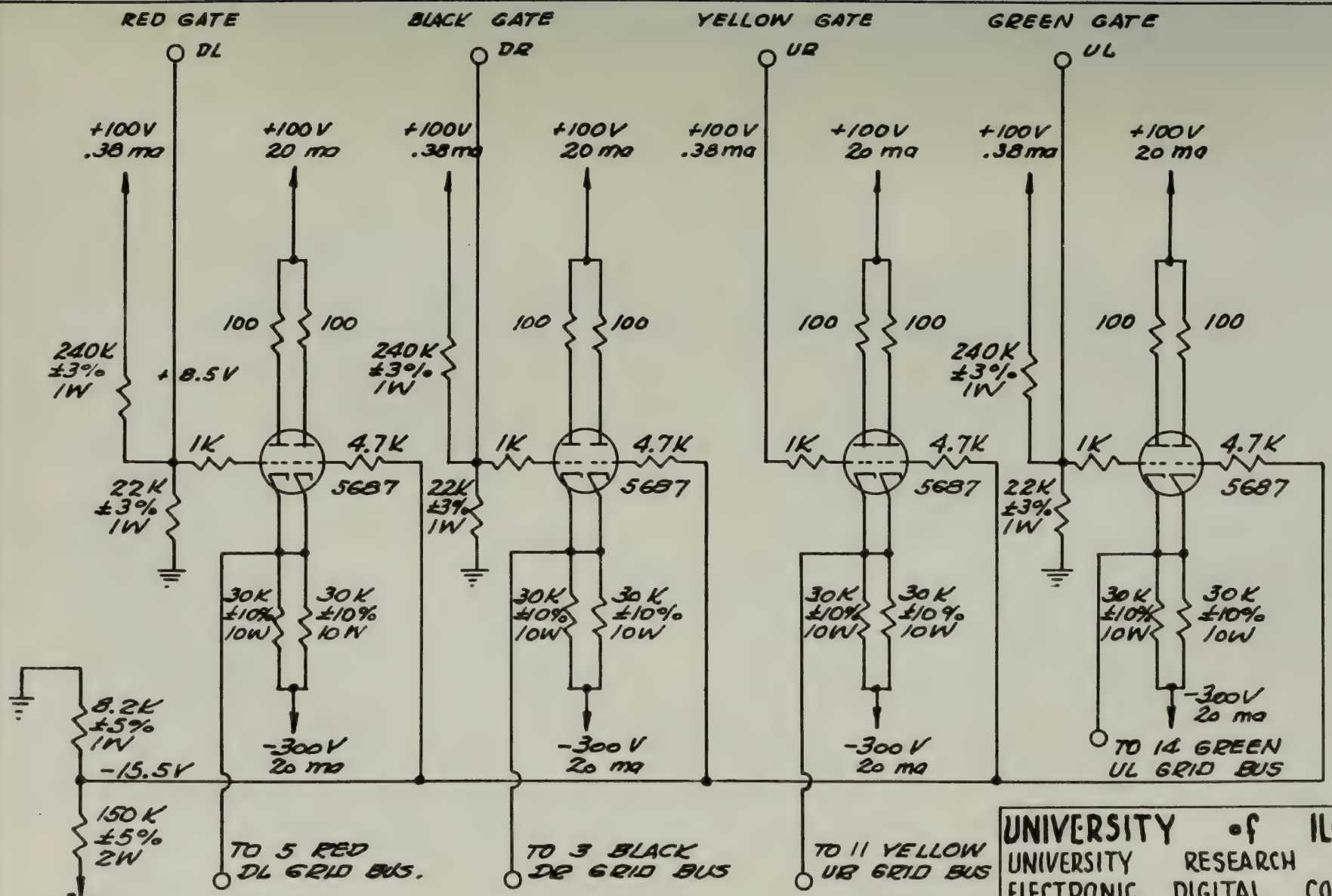
UNIVERSITY RESEARCH BOARD
ELECTRONIC DIGITAL COMPUTER
DRAWN FOR REM DRAWN BY HW
CHECKED R.E.M. APPROVED R.E.M.
TITLE GATE DRIVER RI
DATE 8-16-50 DRWG. Nº 201



~NOTES~

1. RESISTORS NOT SPECIFIED ARE ½W, ± 20%.
2. ALL FILAMENTS AT GRND.
3. ONE REQ'D. PER REGISTER.

REDRAWN FROM DRWG. #138 DATED 3-7-50.

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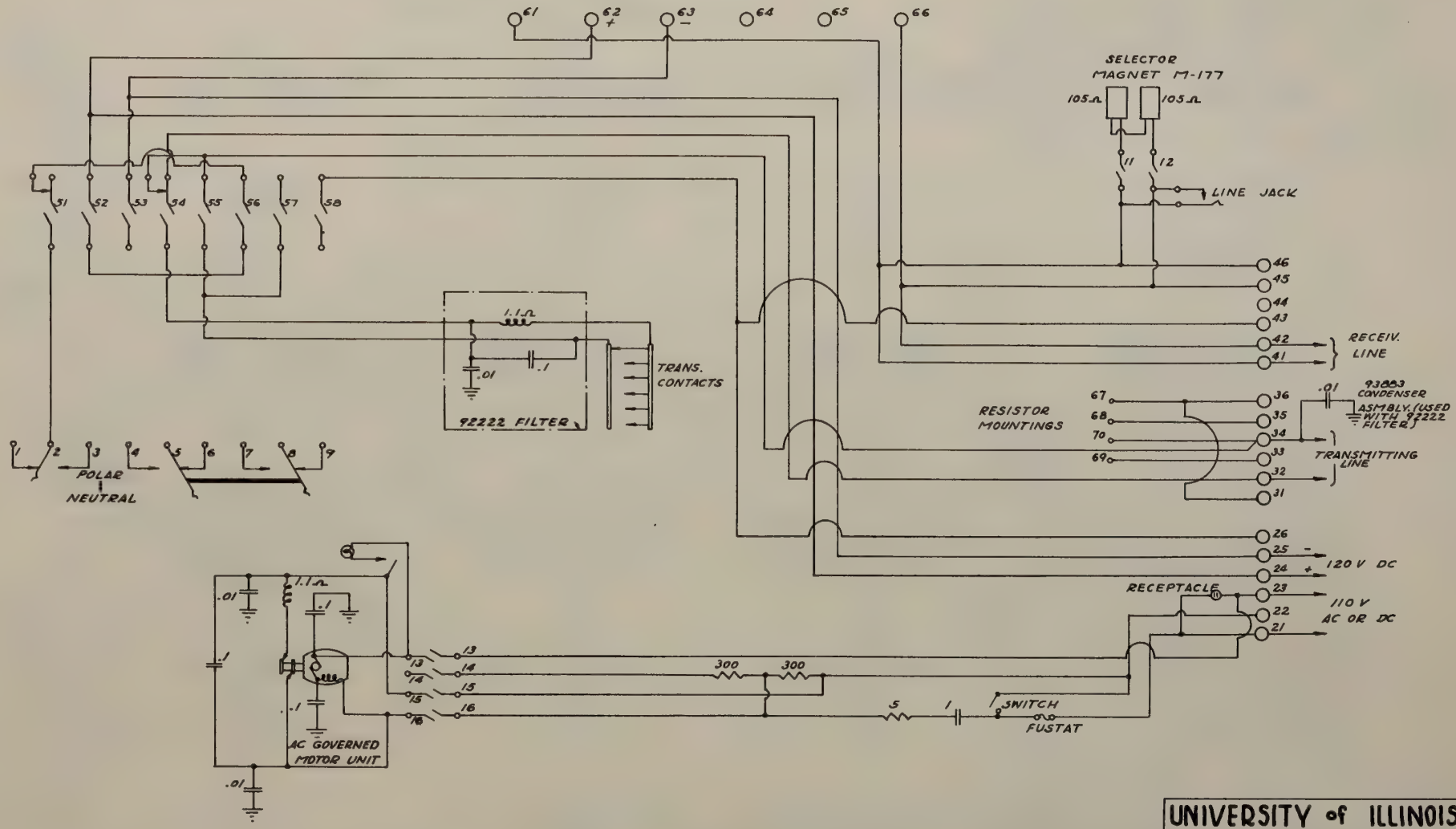
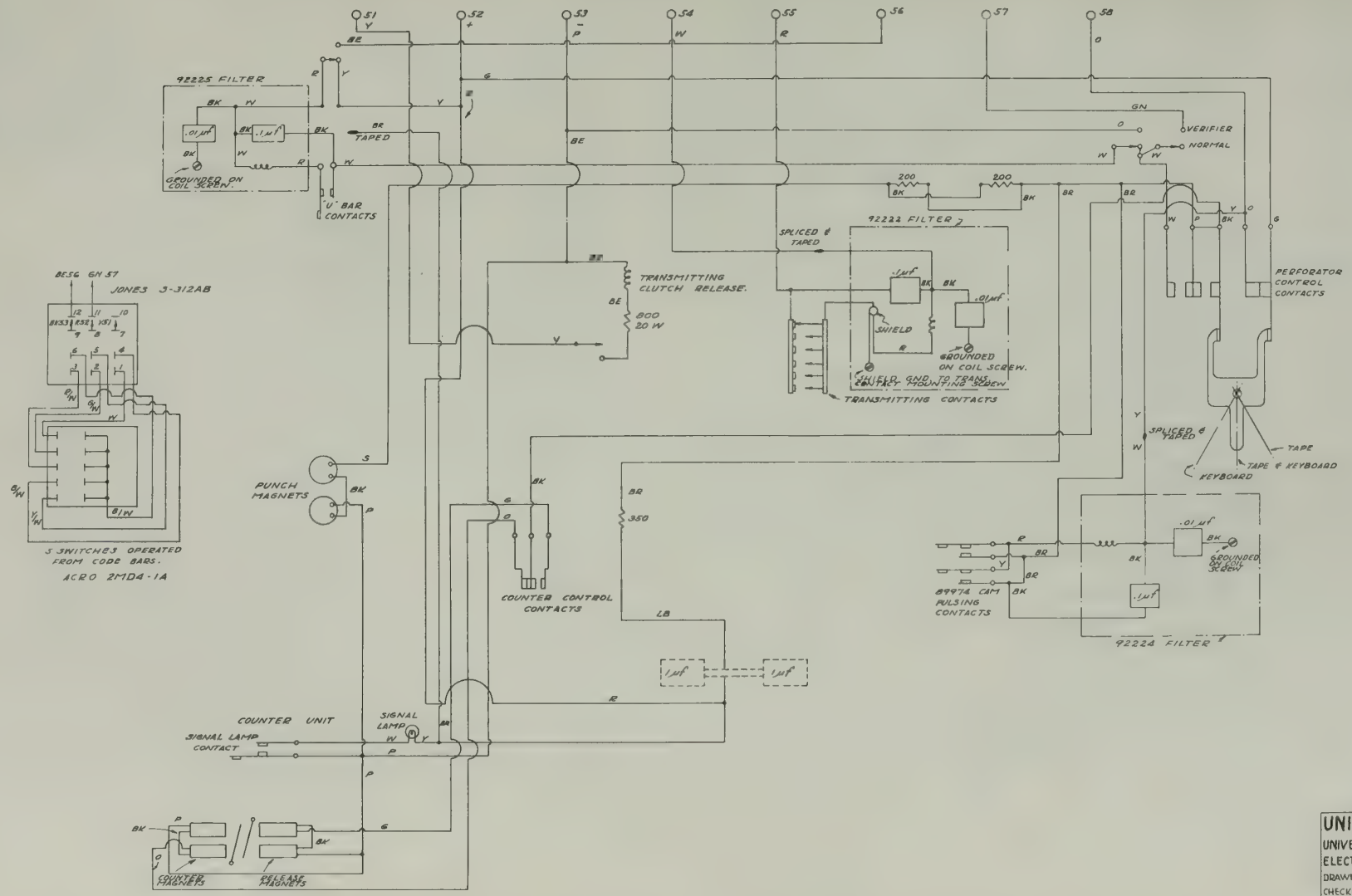
UNIVERSITY RESEARCH BOARD
ELECTRONIC DIGITAL COMPUTER

DRAWN FOR REM DRAWN BY HW
CHECKED R.E.M. APPROVED R.E.M.
TITLE GATE DRIVER RII

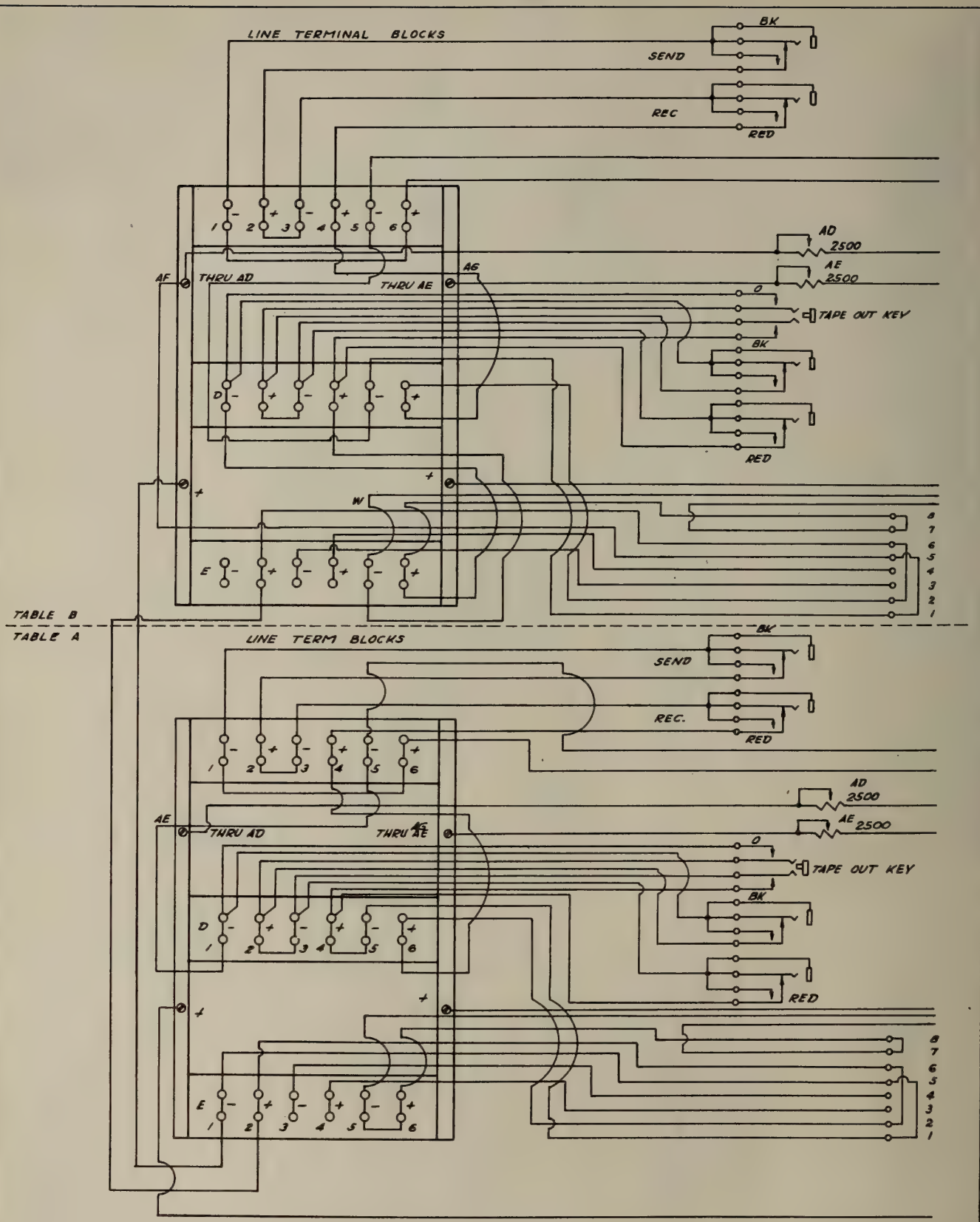
DATE 8·16·50 DRWG. Nº 202



UNIVERSITY of ILLINOIS	
UNIVERSITY RESEARCH BOARD	
ELECTRONIC DIGITAL COMPUTER	
DRAWN FOR T.S.	DRAWN BY H.WALKER
CHECKED BY SHAPIN	APPROVED BY R.E. Meagher
TITLE MODIFIED SCHEMATIC - 15 PRINTER SET WITH KEYBOARD	
DATE 9-13-50	DRWG.Nº 208



UNIVERSITY of ILLINOIS
UNIVERSITY RESEARCH BOARD
ELECTRONIC DIGITAL COMPUTER
DRAWN FOR T.S. DRAWN BY H.W.
CHECKED [illegible] APPROVED [illegible]
TITLE WIRING - IS TYPE PERF. TRANS. MOD. FOR VERIFIER
DATE 9.18.50 DRWG. Nº 209



REFER TO DRWG. WD 2161-G FOR ALL WIRING NOT SHOWN.

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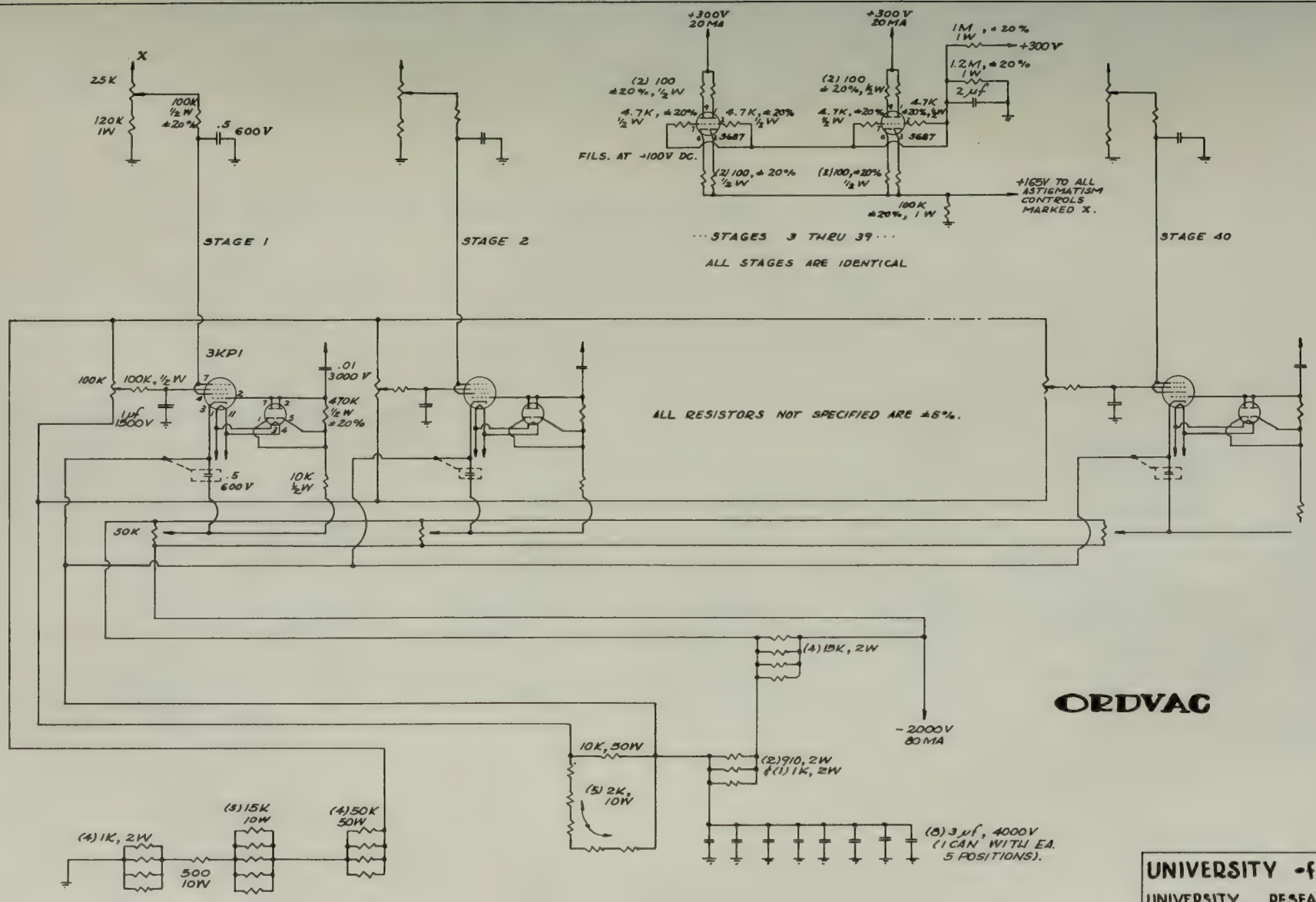
UNIVERSITY RESEARCH BOARD
ELECTRONIC DIGITAL COMPUTER
DRAWN FOR T. S. DRAWN BY H. WALKER
CHECKED T. SHAPIN APPROVED R. E. Meagher
TITLE MODIFICATION OF TELE-TYPE TABLE DRWG. WD 2161-G
DATE 9-19-50 DRWG. Nº 210



ORDVAC

REDRAWN FROM DRWG. OF SAME NO. DATED 10-12-50.
REVISED 11-19-51.

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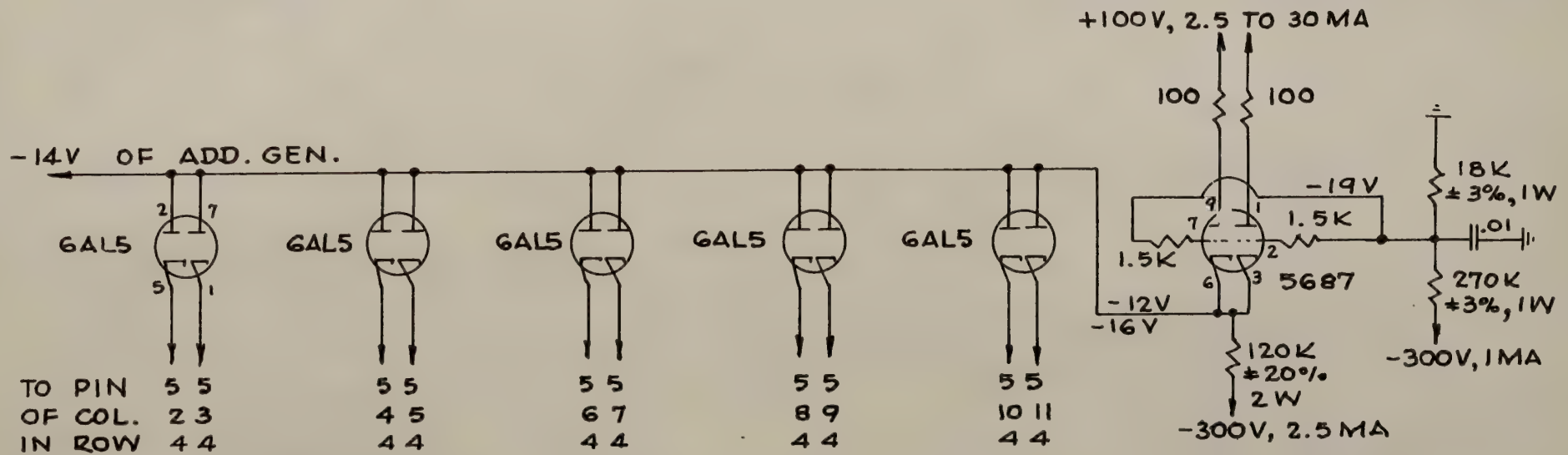
UNIVERSITY RESEARCH BOARD
ELECTRONIC DIGITAL COMPUTER
DRAWN FOR WEJ DRAWN BY HAW
CHECKED W.E.J. APPROVED R.E. Meagher
TITLE FOCUS INTENSITY
DATE JAN 9, 1951
M-216



RESISTORS NOT SPECIFIED ARE ±20%, ½ W.

REDRAWN FROM DRWG OF SAME NO. DATED 11·10·50.

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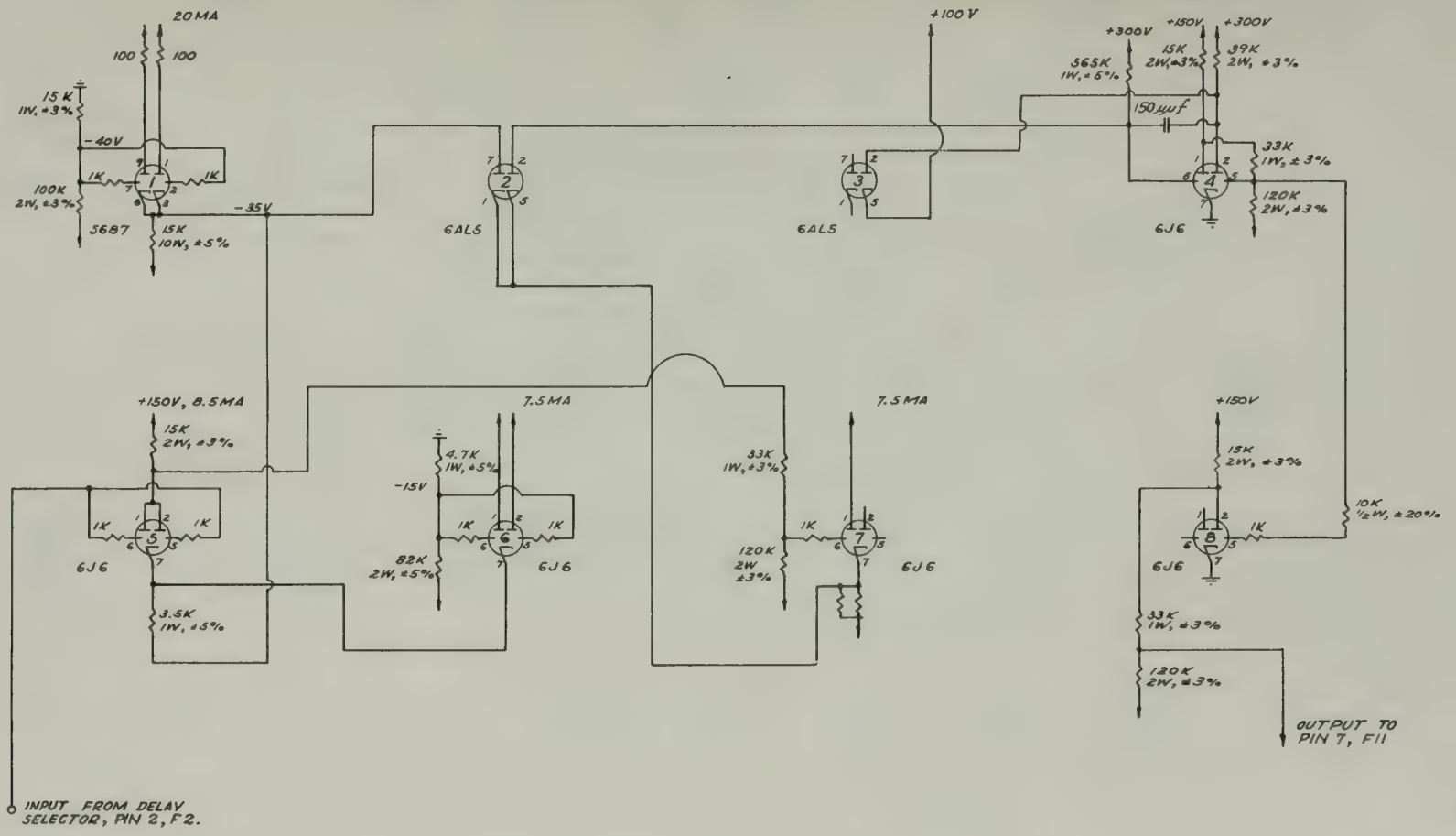
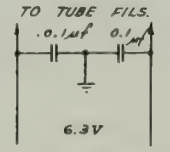
FOR WEJ BY HMW CHECKED W. JONES APPROVED R. E. Meagher. DATE 6·25·51 S·231

TITLE ~ DIODE CHASSIS FOR ADDRESS GENERATOR

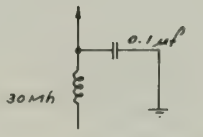


WHEN NOT SPECIFIED:

1. ALL UP VOLTAGES ARE +100V.
2. - DOWN - - -300V.
3. - RESISTORS ARE 120K, 2W, ± 10%.
4. - TOLERANCES ARE 1/2W, ± 50%.
8. - FILAMENTS AT GROUND.



FILTER FOR FILAMENT VOLTAGES



FILTER FOR DC. VOLTAGES.

REVISED 1·8·50 JMW

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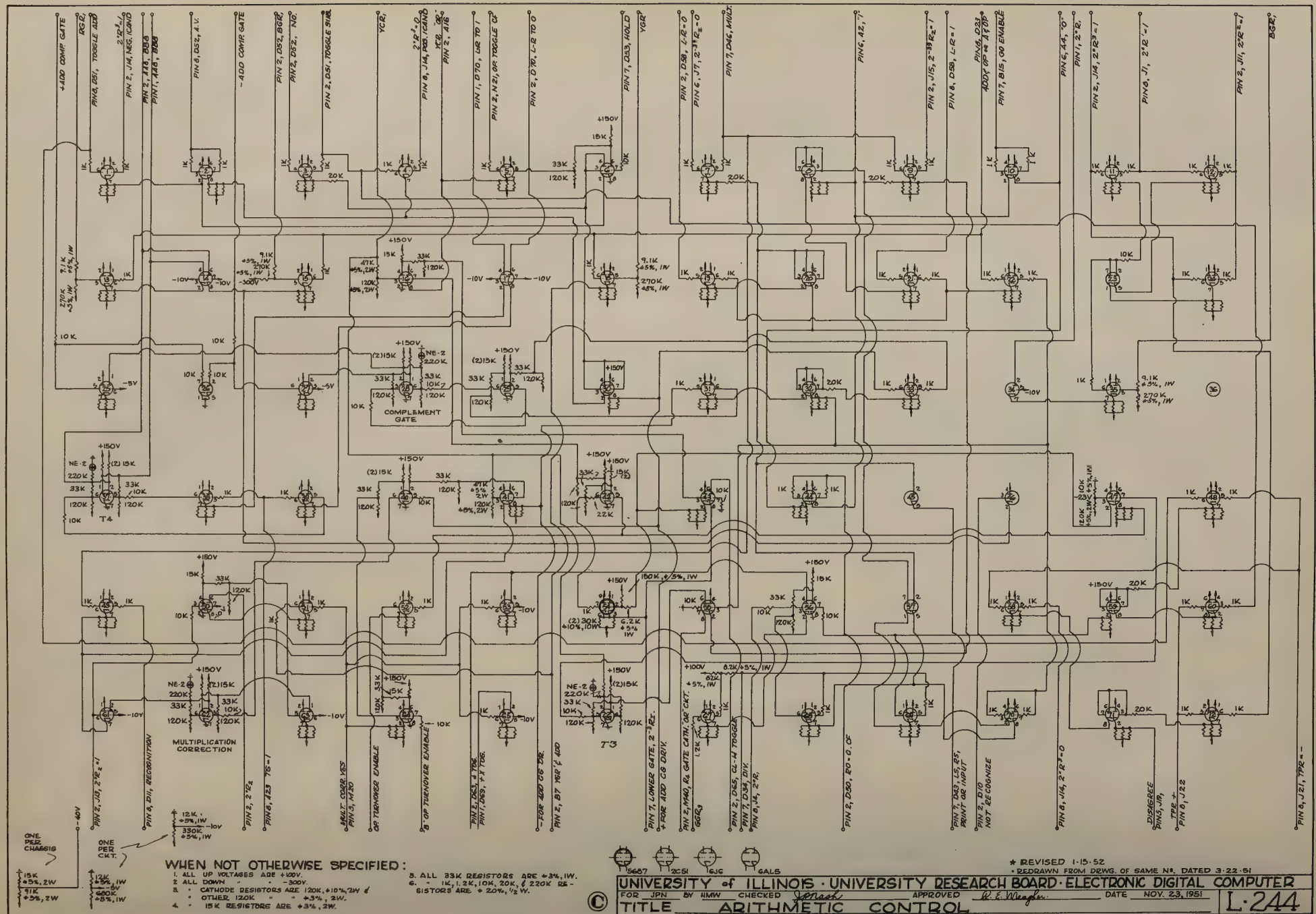
DRAWN FOR J.W.W. DRAWN BY HANK W.
CHECKED J.W.W. APPROVED R.E. Meagher
TITLE CARRY DELAY II
DATE DEC. 18, 1950

M-236



WHEN NOT OTHERWISE SPECIFIED:

1. ALL UP VOLTAGES ARE +100V.
2. ALL DOWN " " -300V.
3. " CATHODE RESISTORS ARE 120K, ±10%, 2W &
   " OTHER 120K " " ±3%, 2W.
4. " 15K RESISTORS ARE ±3%, 2W.
5. ALL 33K RESISTORS ARE ±3%, 1W.
6. " 1K, 1.2K, 10K, 20K, & 220K RESISTORS ARE ± 20%, 1/2 W.

★ REVISED 1-15-52
• REDRAWN FROM DRWG. OF SAME NO. DATED 3-22-51

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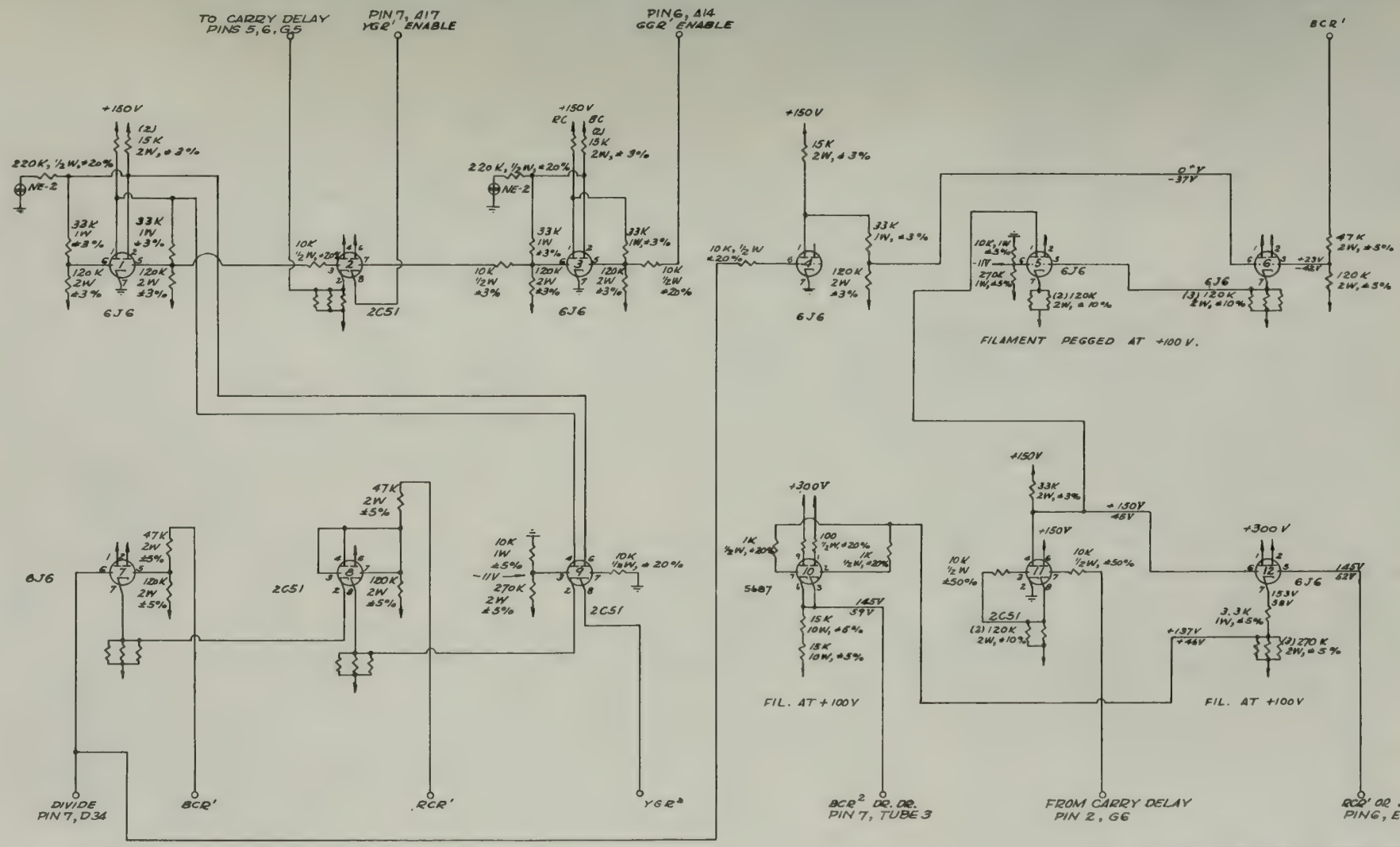
FOR JPN BY HMW CHECKED Jnash APPROVED W. E. Meagher DATE NOV. 23, 1951

TITLE ARITHMETIC CONTROL

L-244



WHEN NOT SPECIFIED:

1. ALL RESISTORS ARE 120K, 2W, ±10%.
2. ALL UP VOLTAGES ARE +100 V.
3. " DOWN " ARE −300 V.
4. FIL. AT GND.

REDRAWN FROM DRWGS. #237 & 238.

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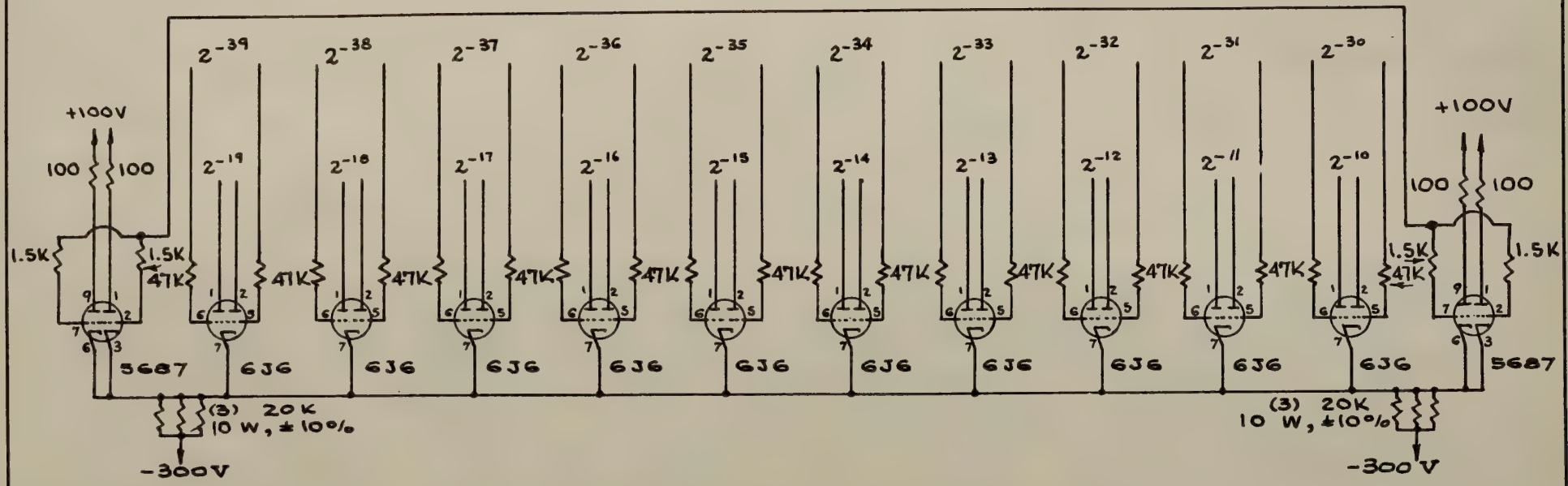
ELECTRONIC DIGITAL COMPUTER

DRAWN FOR JMW DRAWN BY WMW
CHECKED J M W. APPROVED R E Meagher
TITLE DELAY SELECTOR CHASSIS
DATE 1-8-51 DRWG. Nº 245

F



ORDVAC !

~ NOTES ~

1. PLATES CONNECT TO SAME PLATES OF R_3 FLIP-FLOPS WHOSE NUMBERS ARE SHOWN.
2. GRIDS COME FROM SAME GRIDS OF R_3 FLIPFLOPS WHOSE NUMBERS ARE SHOWN.
3. 5687 GRIDS CONNECT TO ODD ADDRESS GATE DRIVER
4. ALL FILAMENTS AT GROUND.
5. RESISTORS NOT SPECIFIED ARE ½W, ± 20 %.

CC

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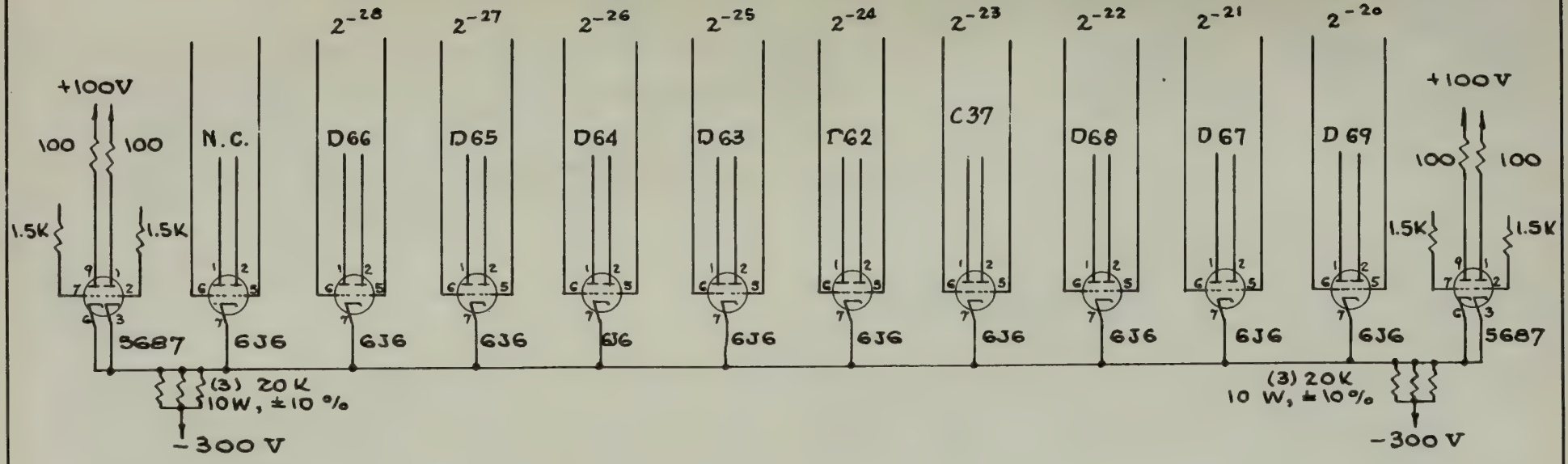
ELECTRONIC DIGITAL COMPUTER
DRAWN FOR J.P.N. DRAWN BY HMW
CHECKED JPN APPROVED R.E. Meagher
TITLE ODD ADDRESS GATE
CHASSIS
DATE 1-16-51 DRWG. Nº 249



ORDVAC !

~ NOTES ~

1. PLATES CONNECT TO SAME PLATES OF DECODING CHASSIS FLIPFLOPS WHOSE NUMBERS ARE SHOWN.
2. GRIDS COME FROM SAME GRIDS OF R_3 FLIPFLOPS WHOSE NUMBERS ARE SHOWN.
3. 5687 GRIDS CONNECT TO ODD ORDER GATE DRIVER
4. ALL FILS. AT GROUND.
5. RESISTORS NOT SPECIFIED ARE $\frac{1}{2}$W, ± 20%.

BB

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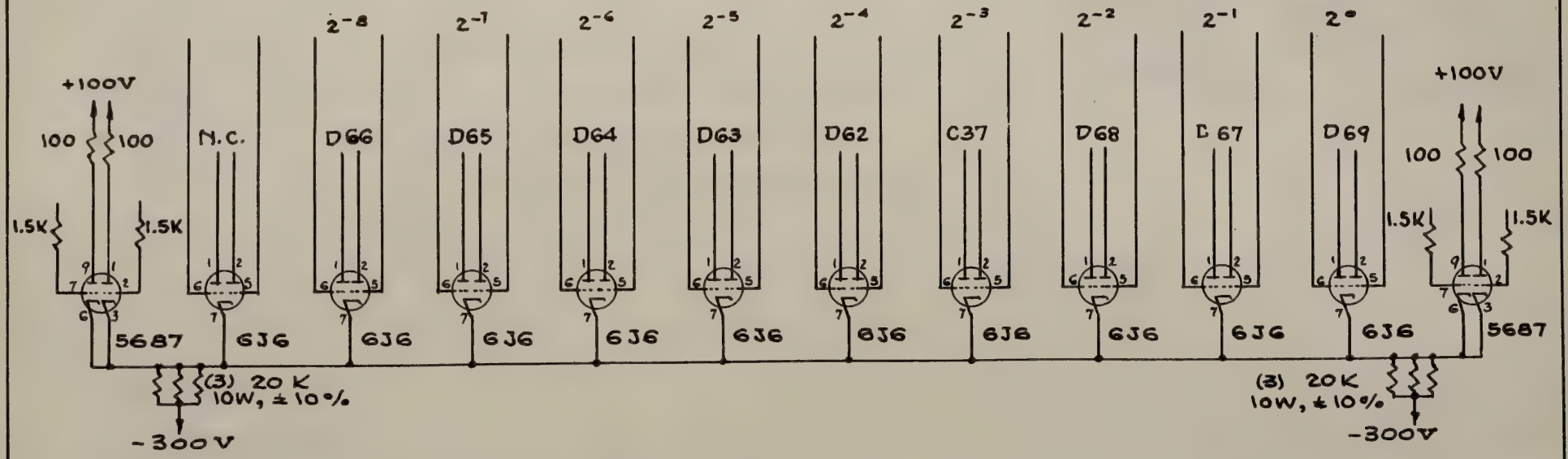
UNIVERSITY RESEARCH BOARD
ELECTRONIC DIGITAL COMPUTER
DRAWN FOR JPN. DRAWN BY HMW.
CHECKED JPN APPROVED R.E. Meagher
TITLE ODD ORDER GATE CHASSIS.
DATE 1·16·51 DRWG. Nº 250



ORDVAC!

~NOTES~

1. PLATES CONNECT TO SAME PLATES OF DECODING CHASSIS FLIP-FLOPS WHOSE NUMBERS ARE SHOWN.
2. GRIDS COME FROM SAME GRIDS OF R_3 FLIPFLOPS WHOSE NUMBERS ARE SHOWN.
3. 5687 GRIDS CONNECT TO EVEN ORDER GATE DRIVER.
4. ALL FILAMENTS AT GROUND.
5. ALL RESISTORS NOT SPECIFIED ARE 1/2 W, ± 20%.

A-A

UNIVERSITY of ILLINOIS
UNIVERSITY RESEARCH BOARD
ELECTRONIC DIGITAL COMPUTER
DRAWN FOR JPN DRAWN BY HMW
CHECKED JPN APPROVED R.E. Meagher
TITLE EVEN ORDER GATE CHASSIS
DATE 1·16·51 DRWG. Nº 251

WHEN NOT SPECIFIED:

1. ALL PLATE RESISTORS ARE 100, ± 20%, ½ W.
2. " GRID RESISTORS ARE 10K, ± 20%, ½ W.
3. " CATHODE " " 12.0K, ± 10%, 2W.
4. " UP VOLTAGES ARE +150V.
5. " DOWN " ARE −300 V.
6. " TUBES ARE 2C51'S.

ORDVAC!

DD

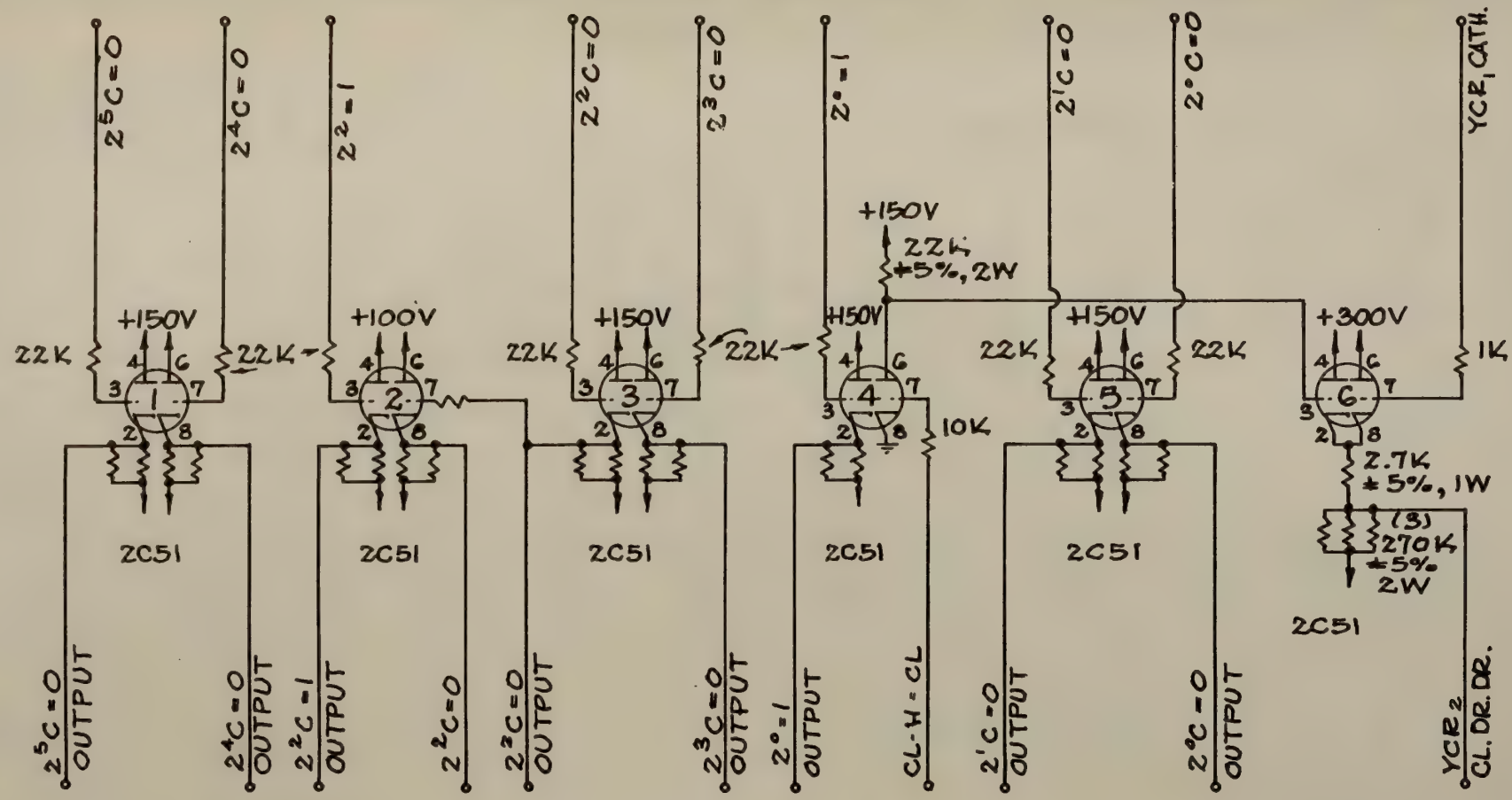
REVISED & REDRAWN FROM DRWG. OF SAME NO. DATED 1-17-51.

UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER

FOR J.P.N. BY W.M.W. CHECKED J.P.Nash APPROVED R. E. Meagher DATE 4-12-51

TITLE - EVEN ADDRESS CATHODE FOLLOWER CHASSIS

M-252



WHEN NOT SPECIFIED:

1. ALL DOWN VOLTAGES ARE −300V.
2. " CATH. RESISTORS ARE 120K, ±10%, 2W.
3. " OTHER " " ±20%, ½W.
4. FILS OF V6 AT +100V. ALL OTHER FILS AT GRND.

•REDRAWN FROM DRWG. OF SAME NO. DATED 2·1·51.

(H)

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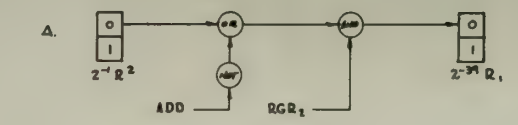
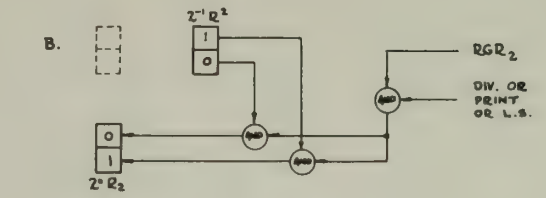
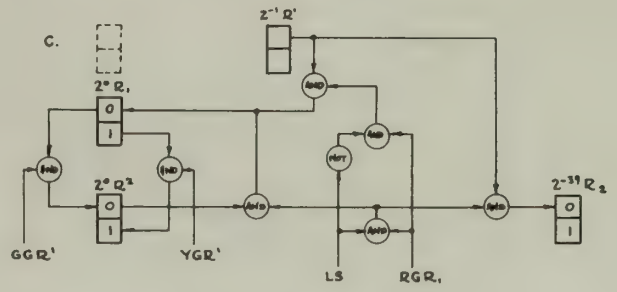
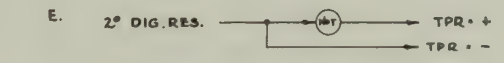
FOR JMW BY HMW CHECKED R.E. Meagher. APPROVED R.E. Meagher. DATE 2·29·52 S·253

TITLE ~ COUNTER OUTPUT CHASSIS

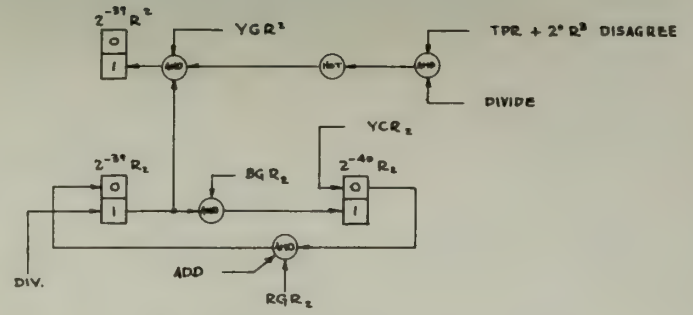




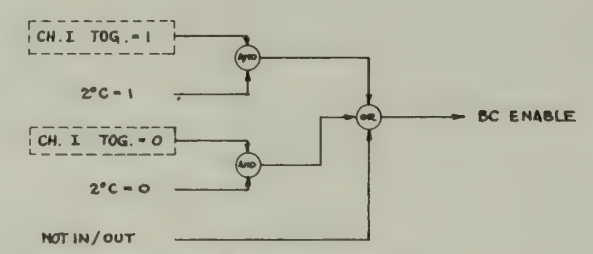




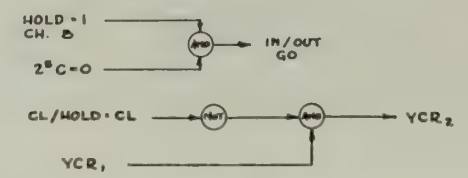
END CONNECTIONS



END CONNECTIONS

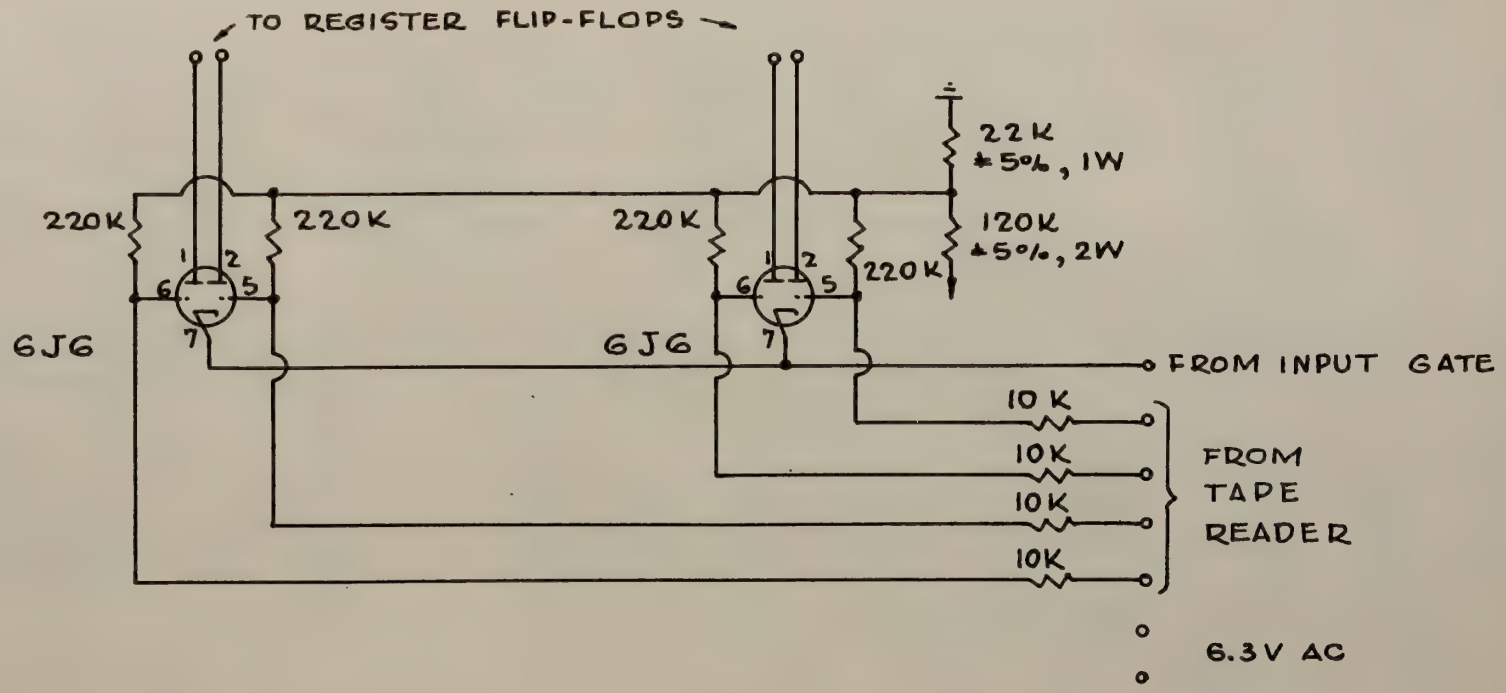


IN/OUT START & SHIFT CHASSIS II



COUNTER OUTPUT CHASSIS

UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER
FOR E.L.H. BY H.M.W. CHECKED APPROVED R. E. Meagher DATE 4-13-51
TITLE ~ END CONNECTION LOGIC
M·257



ALL RESISTORS NOT SPECIFIED ARE ± 20%, 1/2 W.

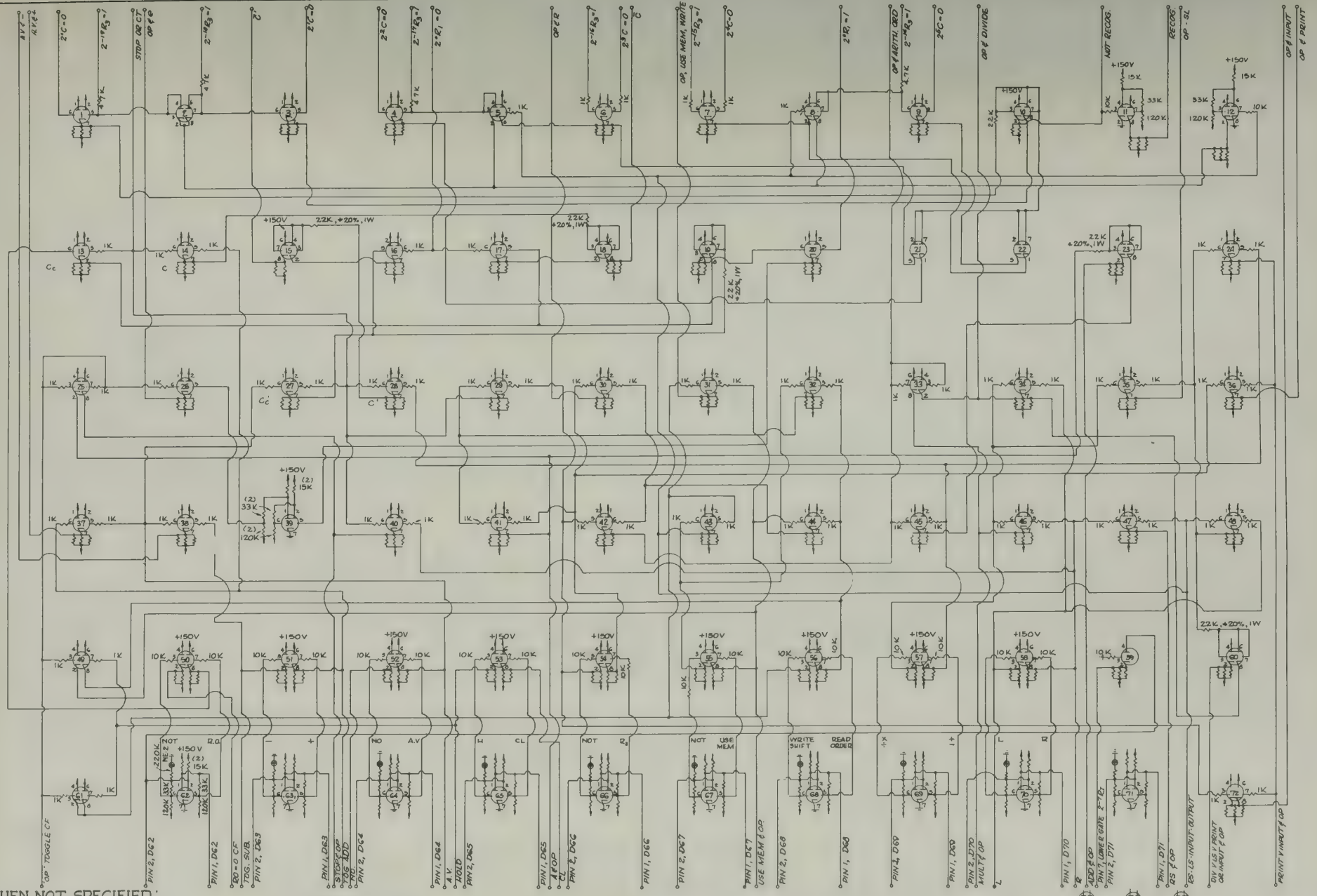
REDRAWN FROM DRWG OF SAME NO. DATED 1.22.51.

UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER

FOR T.S. BY HMW CHECKED T. SHAPIN APPROVED R. E. Meagher. DATE 8.25.51

TITLE ~ INPUT GATES FOR INPUT CIRCUIT

S·259



WHEN NOT SPECIFIED:

1. ALL 15K RESISTORS ARE ±3%, 2W.
2. " 33K " " " ±3%, 1W.
3. " CATHODE RESISTORS ARE 120K, ±10% 2W BUT OTHER 120K'S ARE ±3%, 2W.
4. ALL 1K, 1.2K, 4.7K & 10K RESISTORS ARE ±2%, ¼W.
5. ALL UP VOLTAGES ARE +100V.
6. " DOWN " " −300V.
7. TUBES 63 THRU 71 ARE STANDARD FLIPFLOPS & ARE WIRED SAME AS 6CZ.

· REVISED & REDRAWN FROM DRWG OF SAME N° DATED 1 25 51

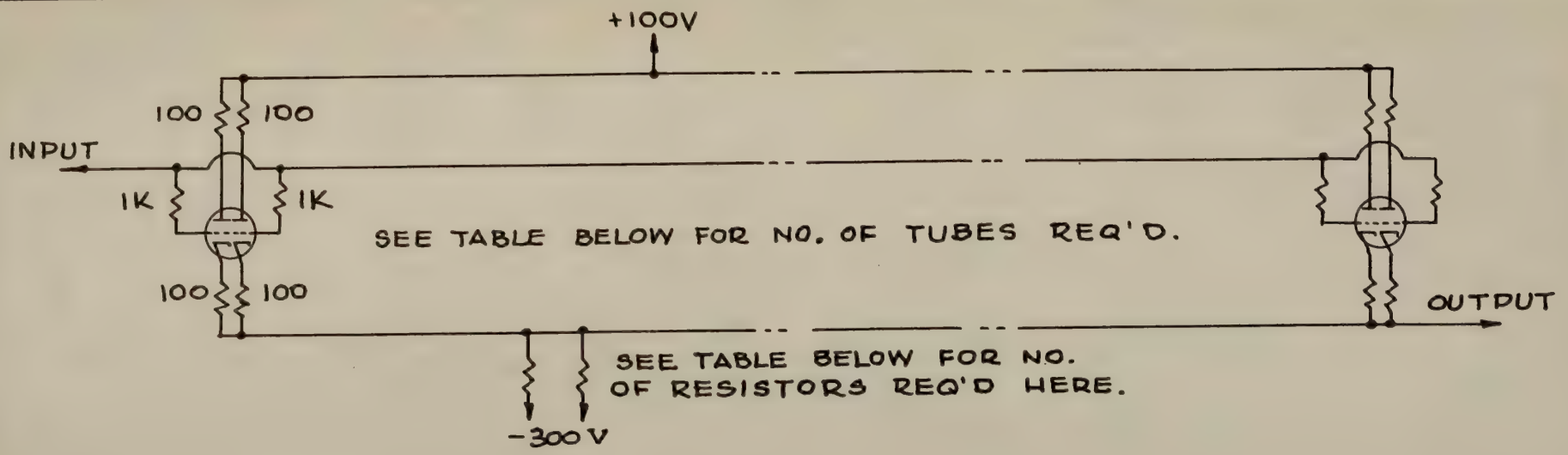
7C51 6J6 6AL5

UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER

FOR JPN BY UMW CHECKED J. Marsh APPROVED R. E. Meagher DATE NOV 27, 1951

TITLE - DECODING CHASSIS

L-260



THREE SECTIONS REQUIRED:

SECT I - DASH TEST	22 TUBES	50 - 20K, ±10%, 10W RESISTORS
SECT. II - DASH END	10 "	20 " " " "
SECT. III - DOT	3 "	3 " " " "

ALL TUBES ARE 5687'S. RESISTORS NOT SPECIFIED ARE ±20%, $\frac{1}{2}$W.

REDRAWN FROM DRWG. OF SAME NO. DATED 1-26-51.

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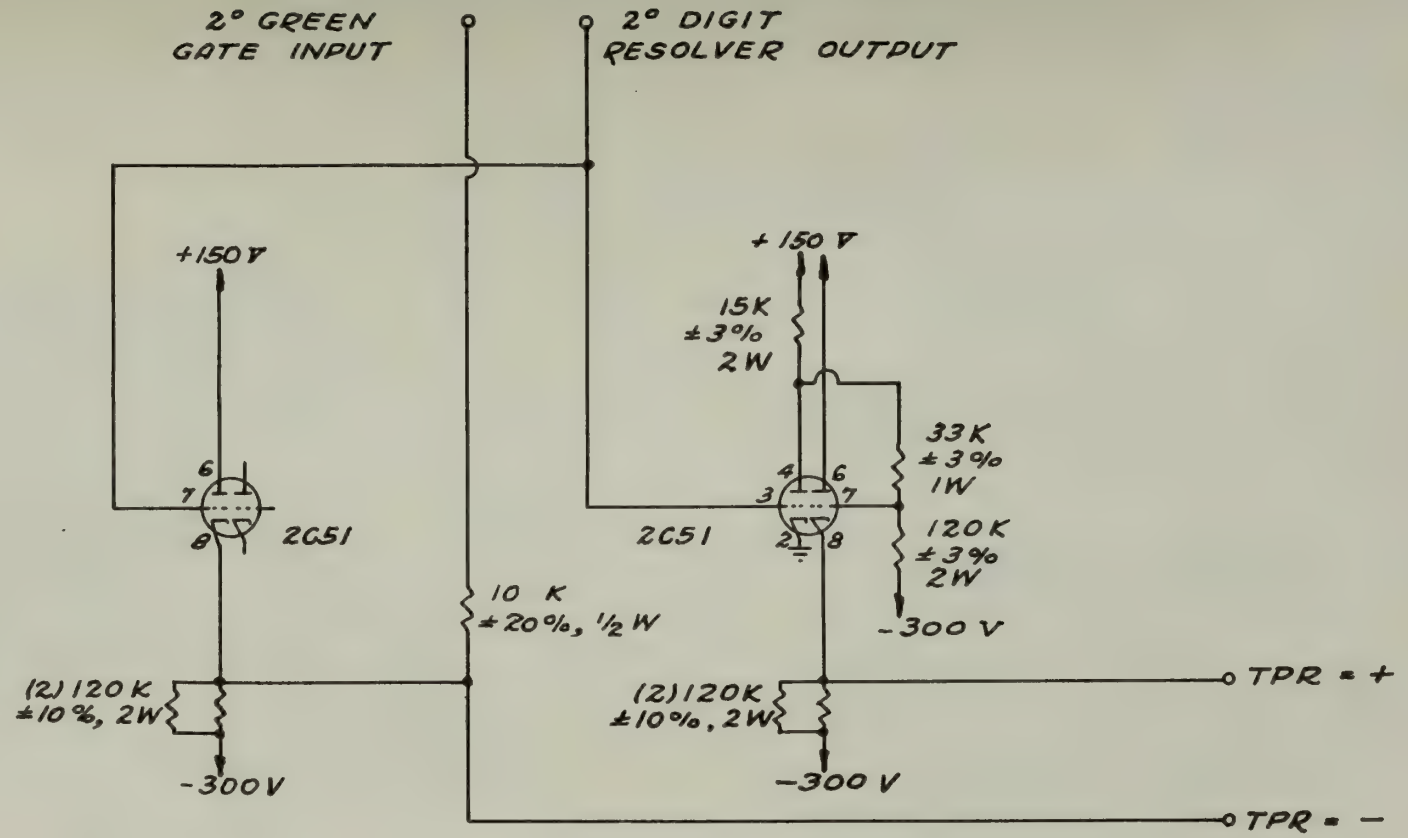
FOR ELH BY HMW CHECKED W. JONES APPROVED R. E. Meagher DATE 6-25-51

TITLE ~ WILLIAMS IV PULSE CATHODE FOLLOWERS

S-261



ALL FILS. AT GROUND.

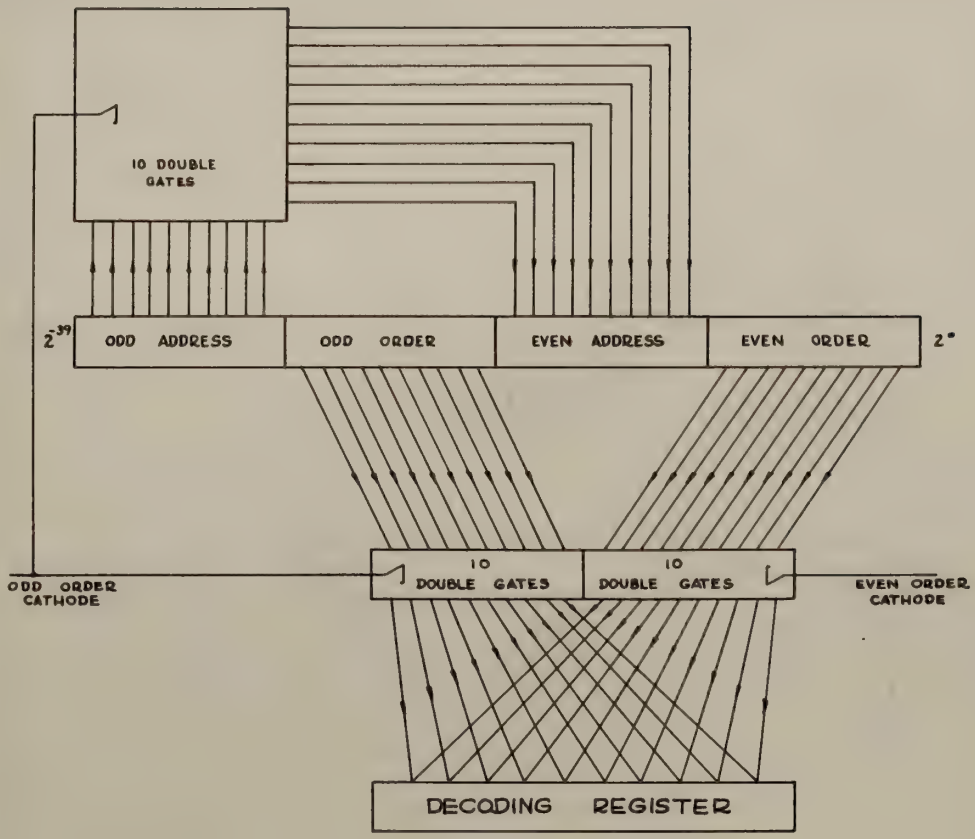
REDRAWN FROM DRAWG. OF SAME NO. DATED 2·6·51.

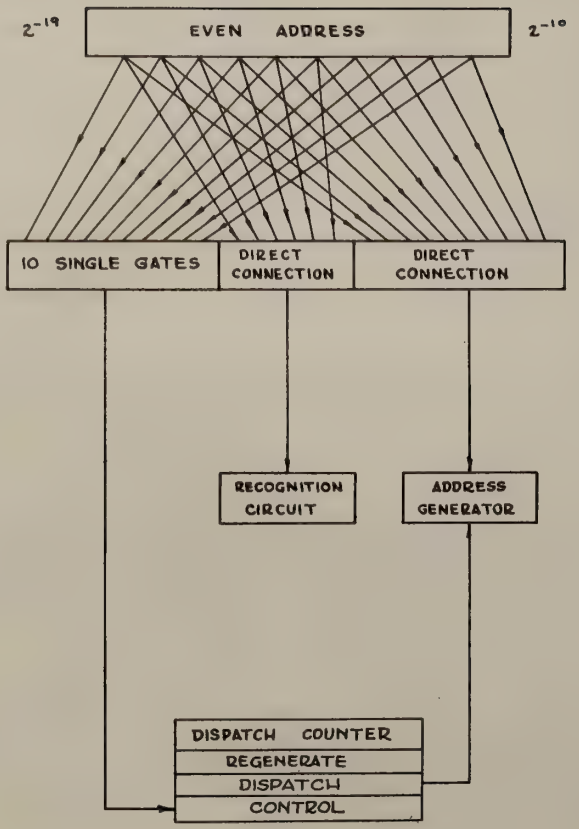
UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER

FOR E.L.H. BY H.M.W. CHECKED ℓ L R APPROVED R.E. Meagher DATE 3·19·51

TITLE TPR OUTPUT CONNECTIONS

S·265





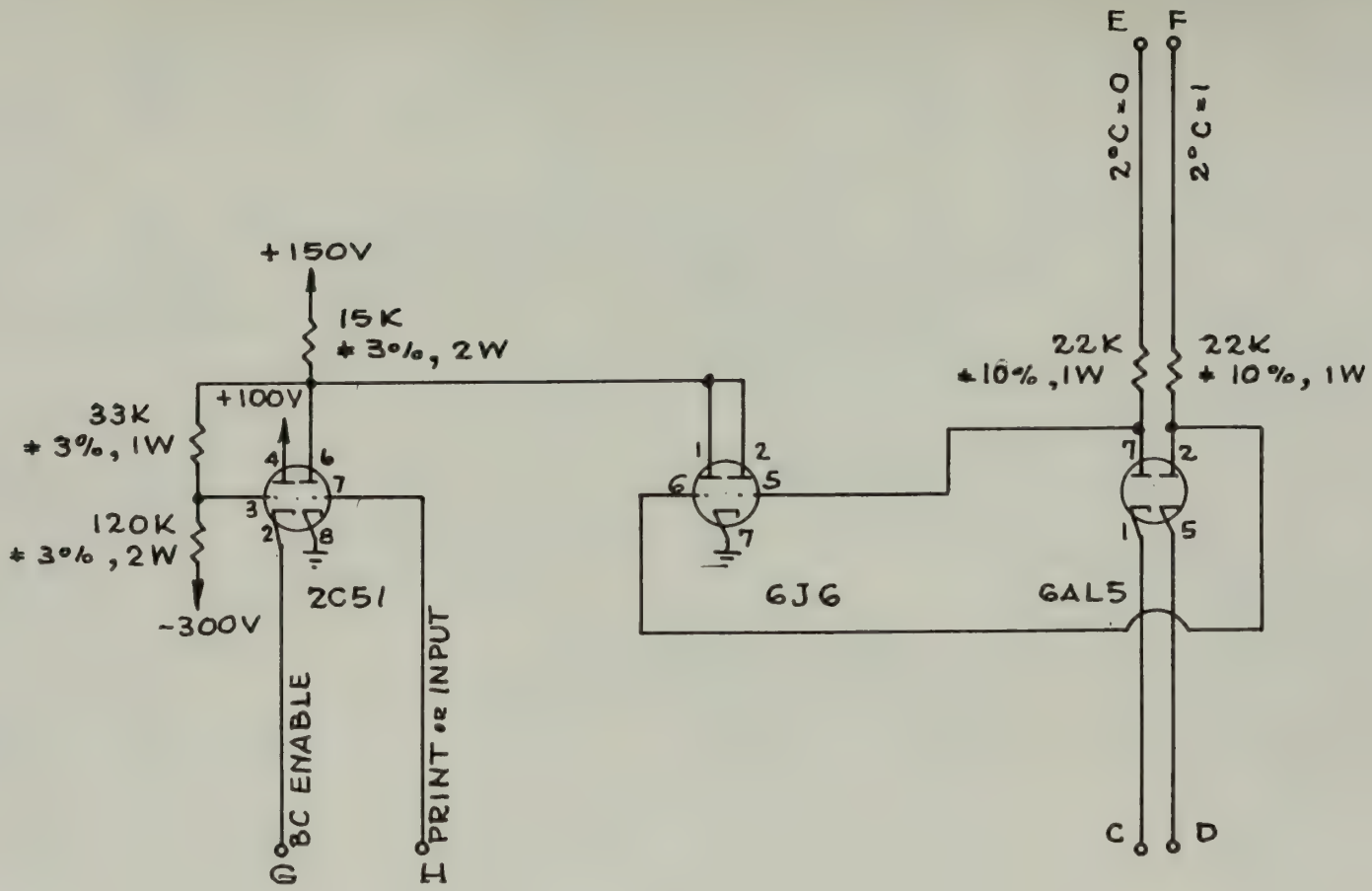
REVISED ~ 7·5·51 · JPN

UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER

FOR JPN BY HMW CHECKED J.P.Nash APPROVED R.E.Meagher DATE 2·21·51

TITLE GATING FROM R_3

M-266



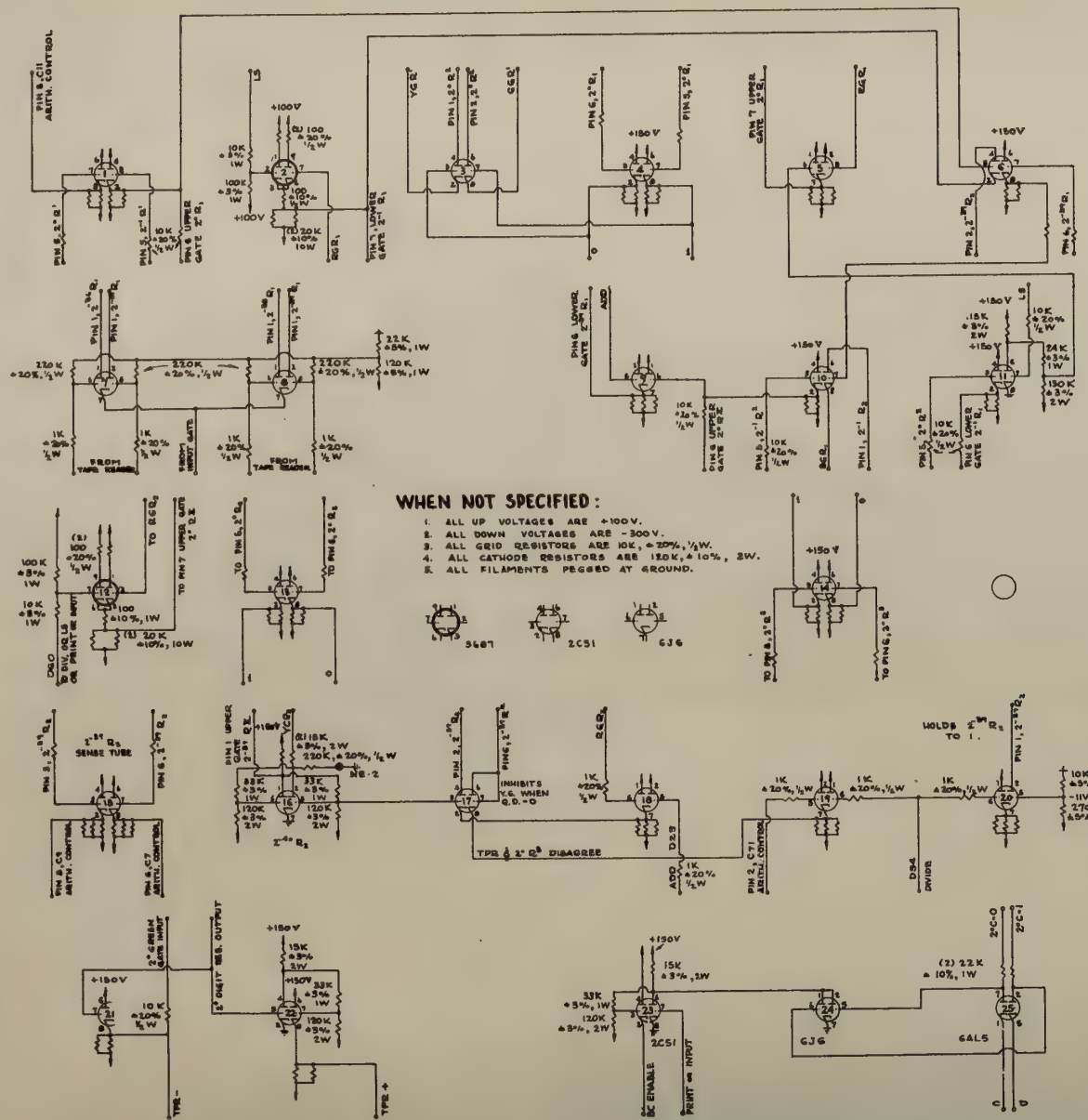
REDRAWN 6·12·51

UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER

FOR J.P.N. BY HMW CHECKED JPNash APPROVED R. E. Meagher DATE 6·12·51

TITLE INPUT-OUTPUT START & SHIFT CHASSIS II

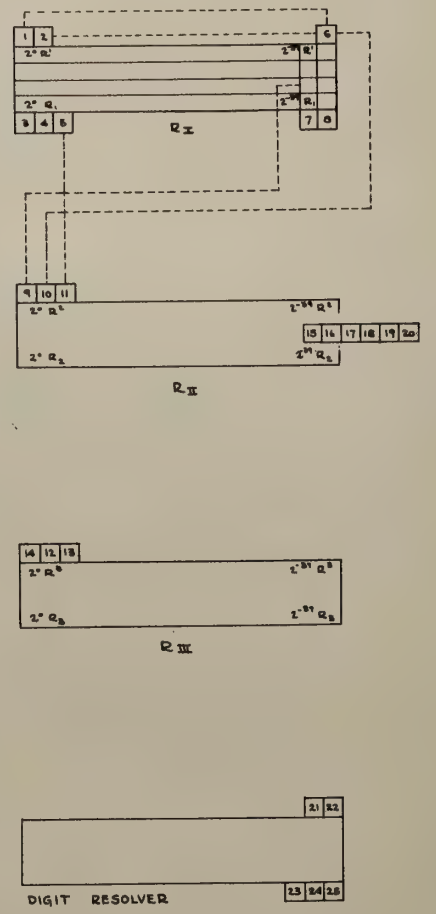
S·271



WHEN NOT SPECIFIED:

1. ALL UP VOLTAGES ARE +100V.
2. ALL DOWN VOLTAGES ARE -300V.
3. ALL GRID RESISTORS ARE 10K, ±20%, ½W.
4. ALL CATHODE RESISTORS ARE 120K, ±10%, 2W.
5. ALL FILAMENTS PEGGED AT GROUND.

END CONNECTION CHASSIS ARRANGEMENT



ORDVAC!

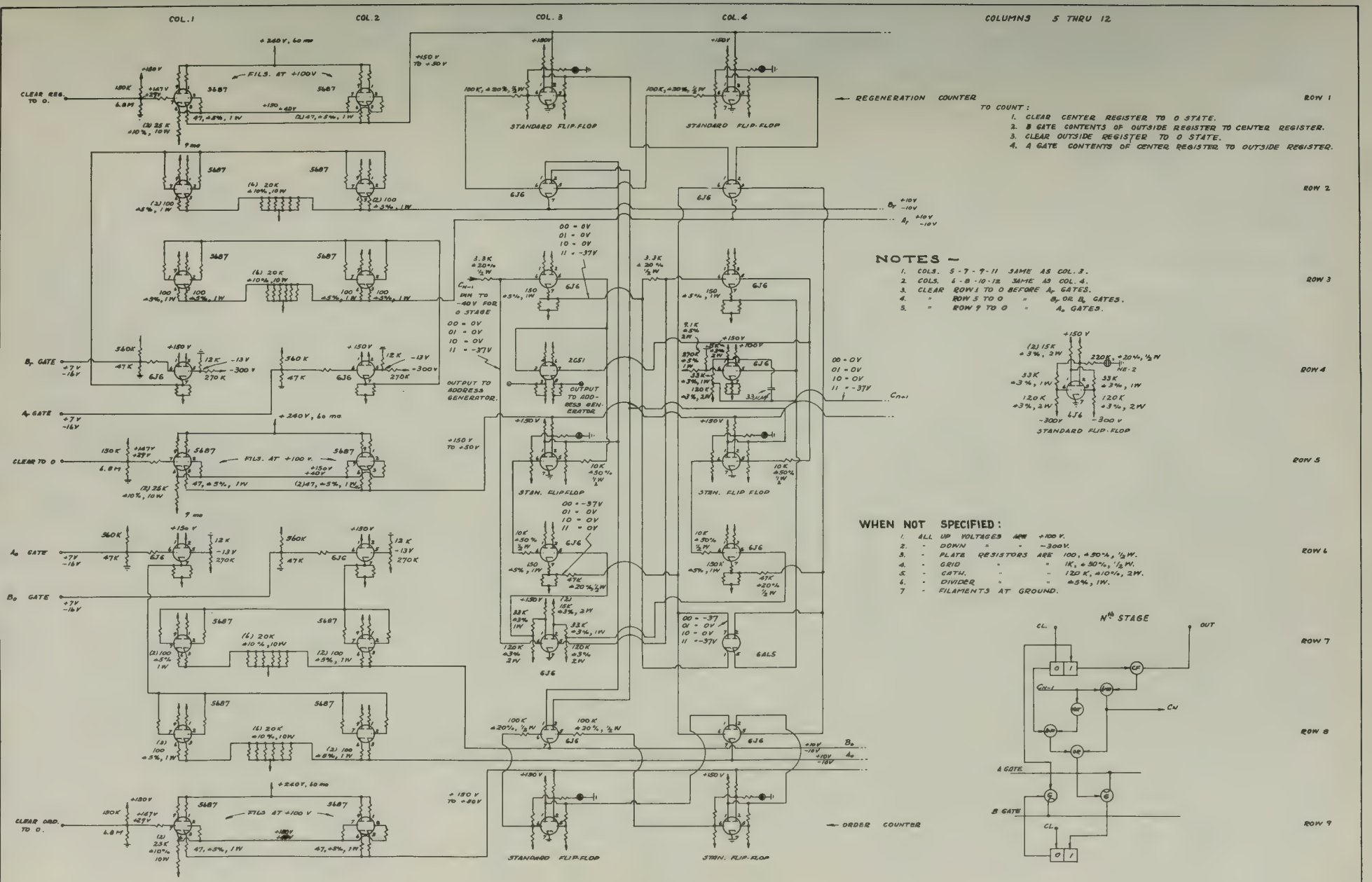
REDRAWN FROM DRWG. NO. 262 DATED 1-29-51. REVISED 6-12-51

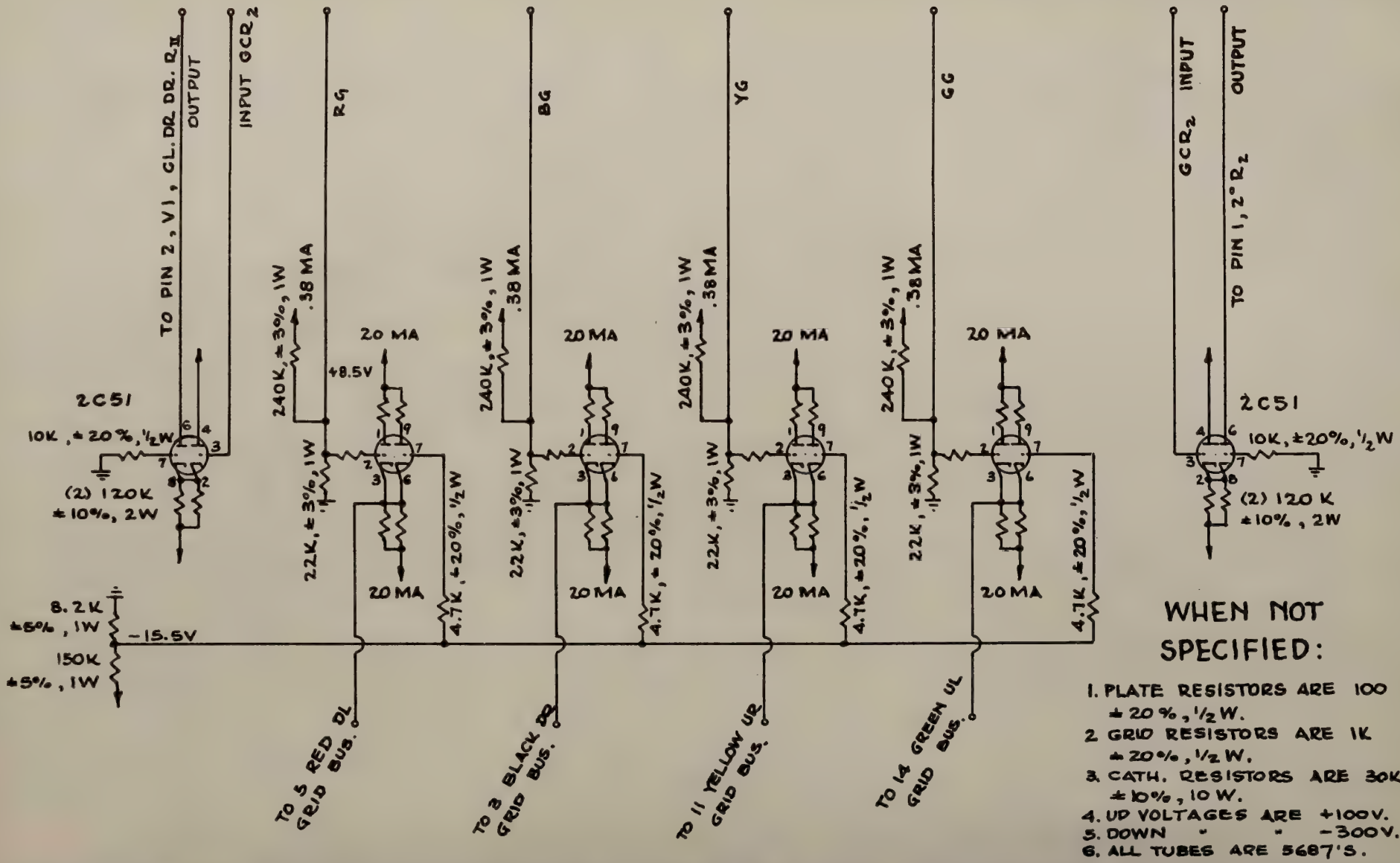
UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER

FOR IEN BY H.T.W CHECKED J.D.Nash. APPROVED M.E.Maeglin DATE 3-9-51

TITLE: END CONNECTION CIRCUITS

L-273


COL. 1
COL. 2
COL. 3
COL. 4
COLUMNS 5 THRU 12
REGENERATION COUNTER
TO COUNT :
1. CLEAR CENTER REGISTER TO 0 STATE.
2. B GATE CONTENTS OF OUTSIDE REGISTER TO CENTER REGISTER.
3. CLEAR OUTSIDE REGISTER TO 0 STATE.
4. A GATE CONTENTS OF CENTER REGISTER TO OUTSIDE REGISTER.
ROW 1
ROW 2
ROW 3
ROW 4
ROW 5
ROW 6
ROW 7
ROW 8
ROW 9
NOTES –
1. COLS. 5 - 7 - 9 - 11 SAME AS COL. 3.
2. COLS. 6 - 8 - 10 - 12 SAME AS COL. 4.
3. CLEAR ROW 1 TO 0 BEFORE A_p GATES.
4. " ROW 5 TO 0 " B_p OR B_q GATES.
5. " ROW 9 TO 0 " A_q GATES.
WHEN NOT SPECIFIED :
1. ALL UP VOLTAGES ARE +100 V.
2. - DOWN " " -300V.
3. - PLATE RESISTORS ARE 100, ±5%, 1/2 W.
4. - GRID " " 1K, ±5%, 1/2 W.
5. - CATH. " " 120 K, ±10%, 2W.
6. - DIVIDER " " ±5%, 1W.
7 - FILAMENTS AT GROUND.
STANDARD FLIP-FLOP
STAN. FLIP-FLOP
ORDER COUNTER
N^th STAGE
A GATE
B GATE
OUT
CL.
CN
CN-1
UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER
TITLE DISPATCH COUNTER
L-274



WHEN NOT SPECIFIED:

1. PLATE RESISTORS ARE 100 ± 20%, 1/2 W.
2. GRID RESISTORS ARE 1K ± 20%, 1/2 W.
3. CATH. RESISTORS ARE 30K ± 10%, 10 W.
4. UP VOLTAGES ARE +100V.
5. DOWN " " -300V.
6. ALL TUBES ARE 5687'S.

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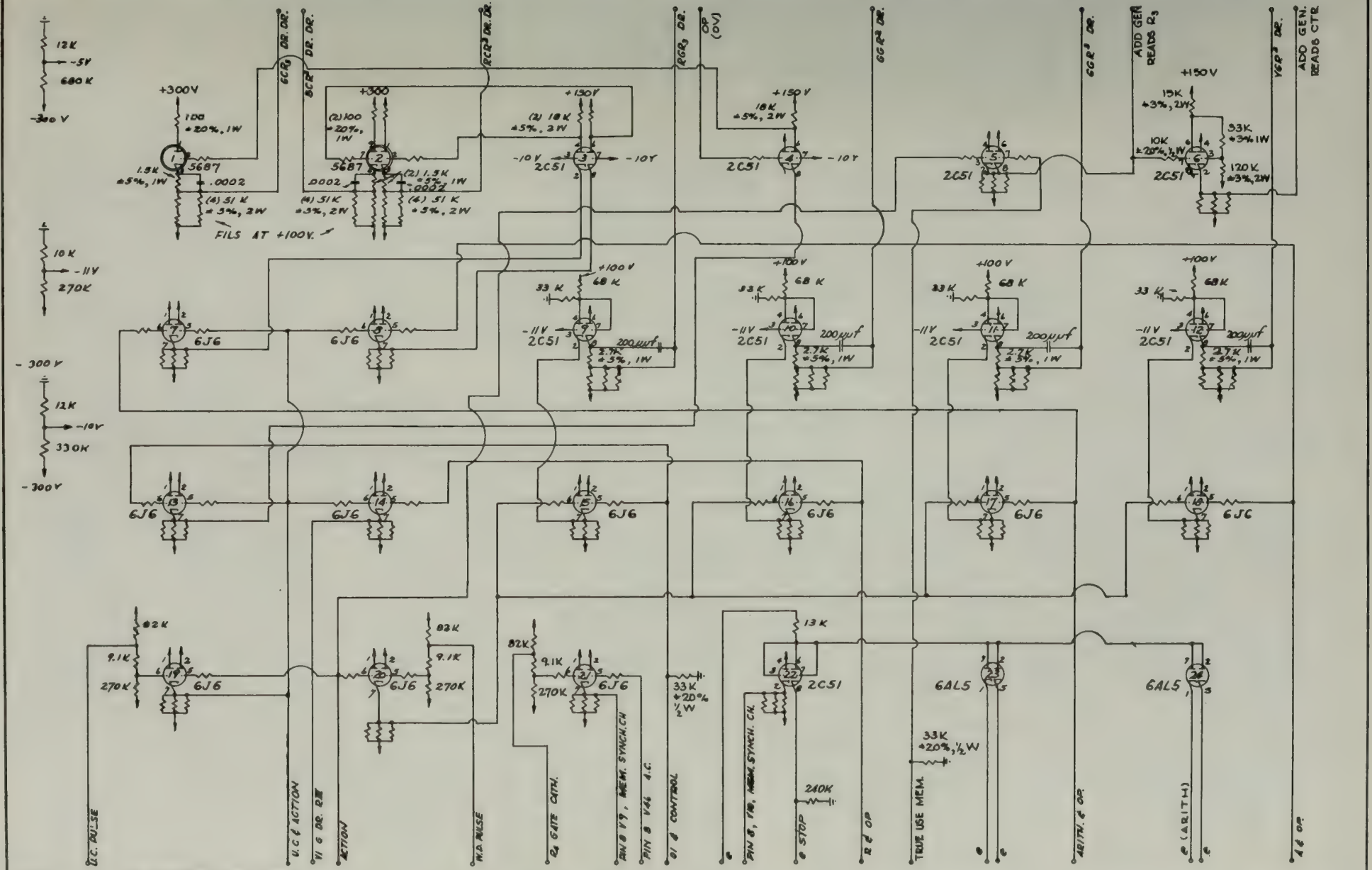
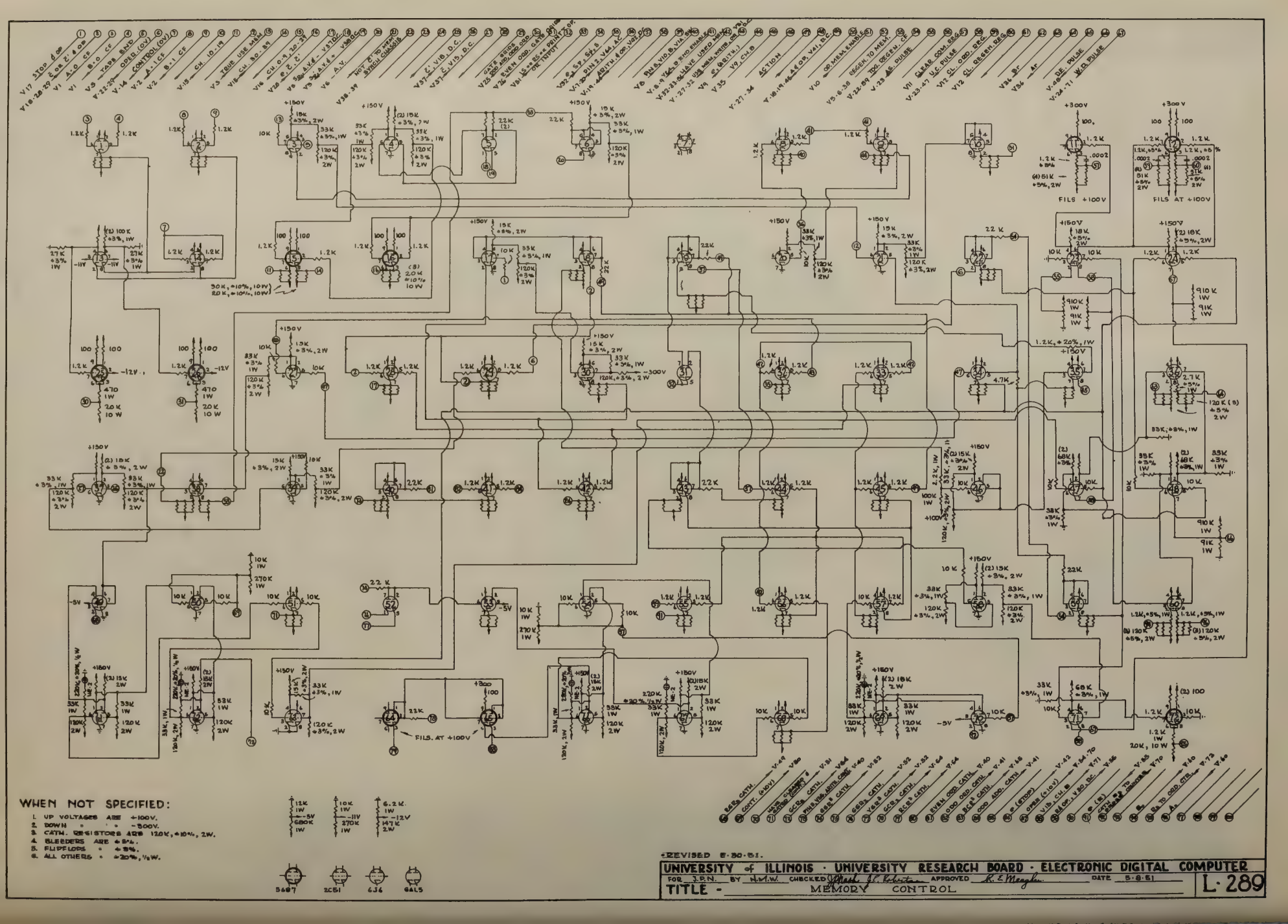
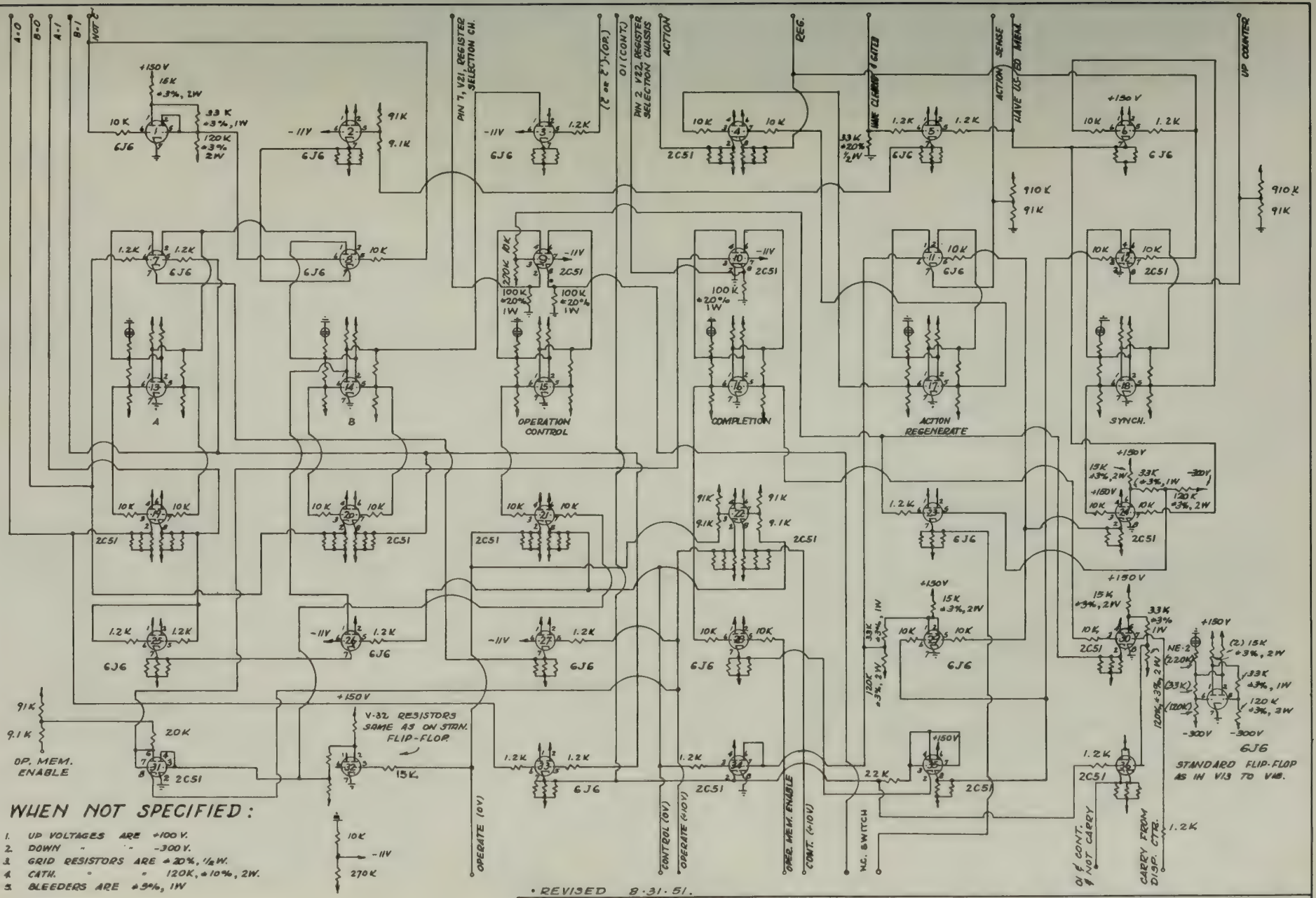
FOR E.L.H. BY H.M.W. CHECKED E.L.H. APPROVED R. E. Meagher DATE 4.19.51

TITLE · GATE DRIVER RIII

S · 280


12K
-5V
680K
-300 V
+300V
100 ±20%, 1W
1.3K ±5%, 1W
.0002
(4) 51 K ±3%, 2W
FILS AT +100V.
5687
+300
(2) 100 ±20%, 1W
.0002
(4) 51 K ±3%, 2W
(2) 1.3K ±5% 1W
.0002
(4) 51 K ±3%, 2W
+150V
(2) 18K ±5%, 2W
-10V
2C51
-10 V
18K ±5%, 2W
+150 V
-10 V
2C51
2C51
+150V
15K ±3%, 2W
33K ±3% 1W
10K ±20%, ½W
120K ±3%, 2W
2C51
10 K
-11V
270K
-300 V
12K
-10V
330K
-300V
+100 V
33 K
68 K
-11V
2C51
200 µµf
2.7K ±3%, 1W
6J6
6J6
6J6
6J6
6J6
6J6
6J6
82K
9.1K
270K
6J6
6J6
6J6
33K ±20% ½W
13K
2C51
6AL5
6AL5
33K ±20%, ½W
240K
WHEN NOT SPECIFIED:
1. UP VOLTAGES ARE +100 V.
2. DOWN " " -300 V.
3. GRID RESISTORS ARE 1.2 K, ± 20%, ½ W.
4. CATH. " " 180 K, ±10%, 2W
5. OTHER " NOT SPECIFIED ARE ± 3%, 1W.
6. FILS. AT GRND.
LATEST REVISION DATE ~ 8·2·51.
UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER
FOR J.P.N. BY H.M.W. CHECKED J.P.Nash APPROVED R. E. Meagher DATE 4·30·51
TITLE REGISTER SELECTION CHASSIS
M-288


WHEN NOT SPECIFIED:
1. UP VOLTAGES ARE +100V.
2. DOWN " " " -300V.
3. CATH. RESISTORS ARE 120K, ±10%, 2W.
4. BLEEDERS ARE ±5%.
5. FLIPFLOPS " ±3%.
6. ALL OTHERS " ±20%, ½W.
5687
2C51
6J6
6AL5
REVISED 8-30-51.
UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER
FOR J.P.N. BY H.M.W. CHECKED APPROVED R. E. Meagher DATE 5-8-51
TITLE - MEMORY CONTROL
L-289



WHEN NOT SPECIFIED:

1. UP VOLTAGES ARE +100 V.
2. DOWN " " -300 V.
3. GRID RESISTORS ARE ±20%, 1/2 W.
4. CATH. " " 120K, ±10%, 2W.
5. BLEEDERS ARE ±5%, 1W

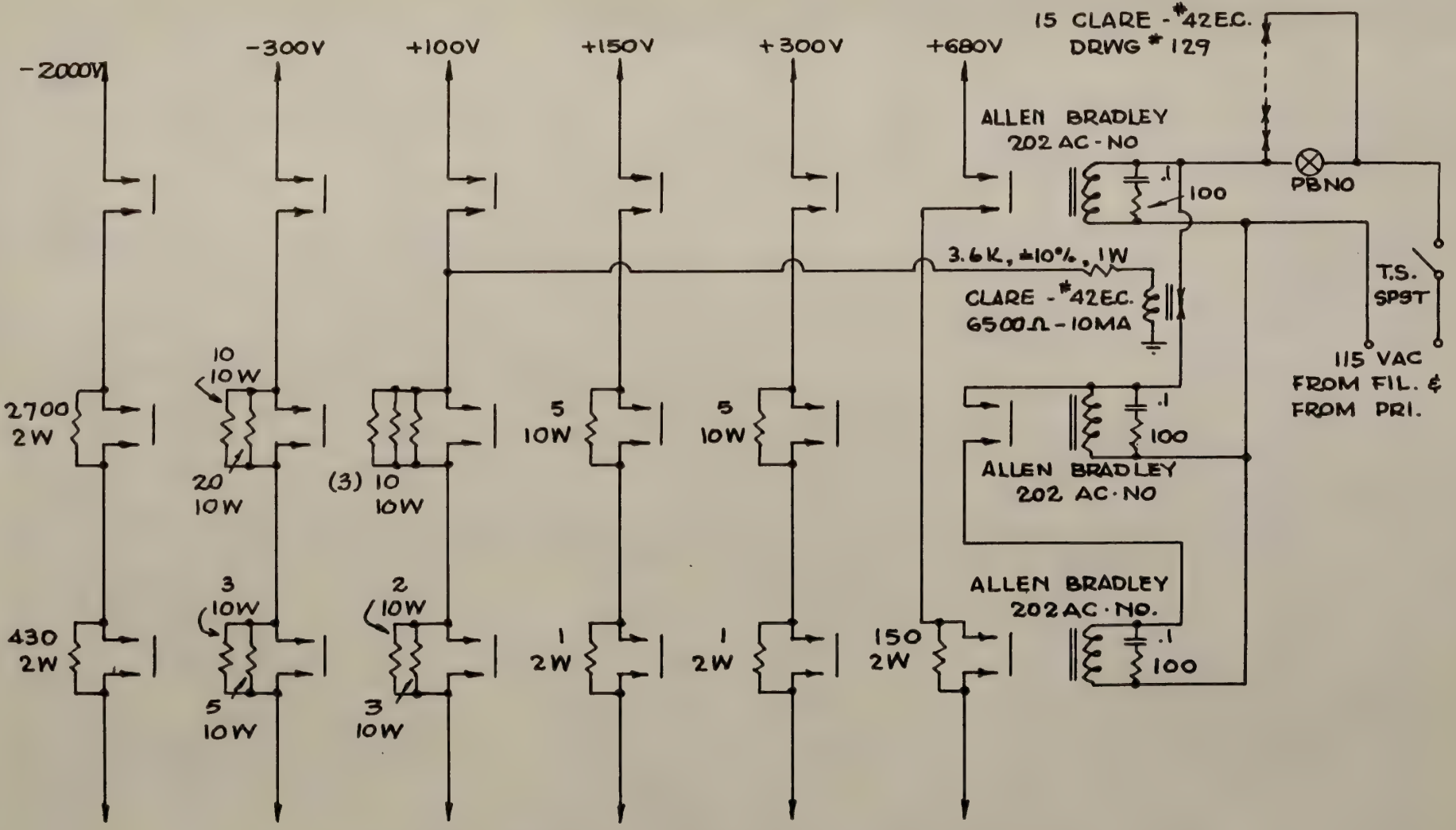
• REVISED 8-31-51.

UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER

FOR IPN. BY H.M.W. CHECKED J.Nash APPROVED R.E. Meagher DATE 5-2-51

TITLE MEMORY SYNCHRONIZATION CHASSIS

M-290

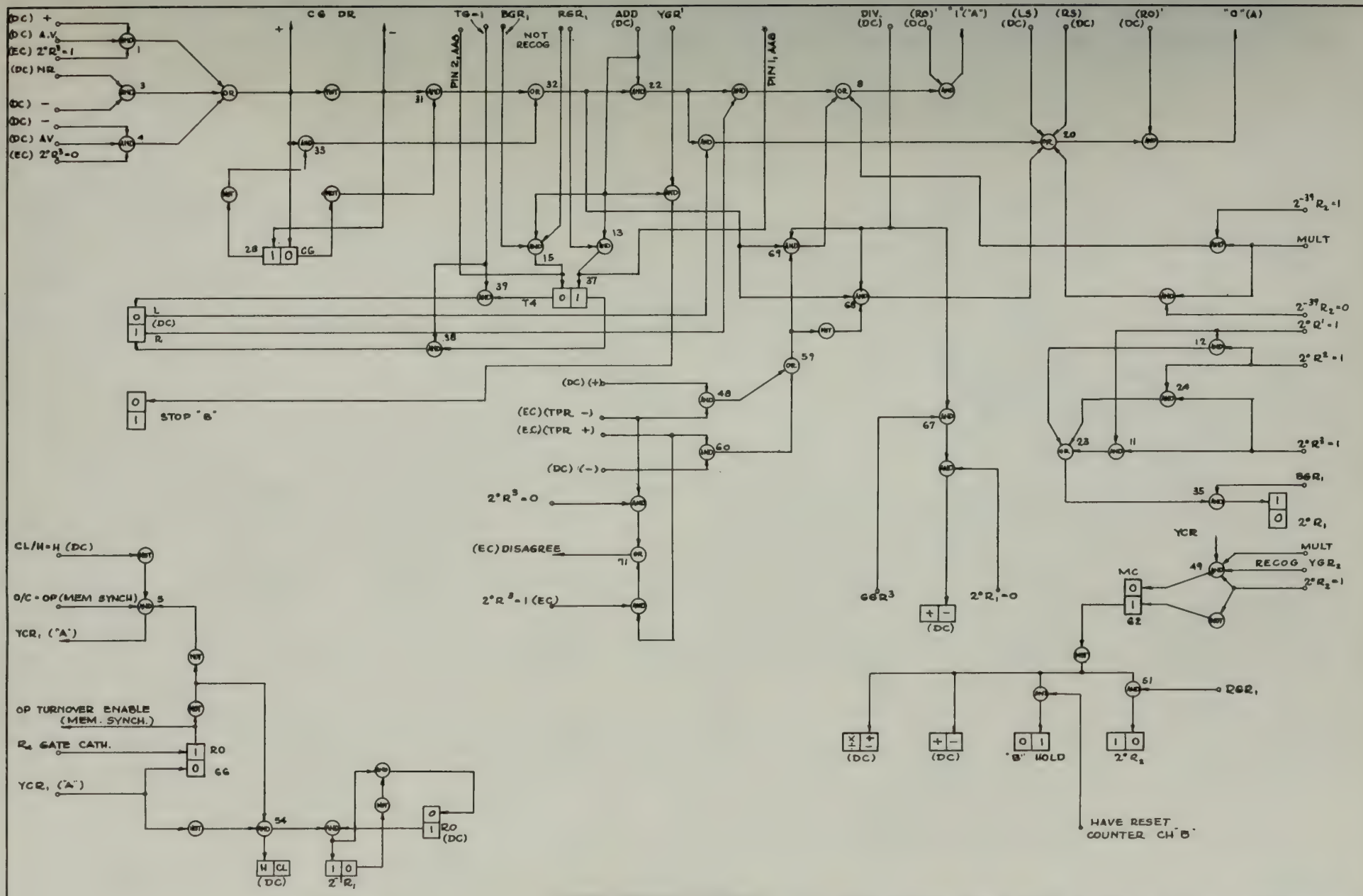


UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD, ELECTRONIC DIGITAL COMPUTER

FOR KWB BY HMW CHECKED K.W. Bartlett APPROVED R. E. Meagher DATE 6-14-51

TITLE ~ D. C. TURN-ON

S-297



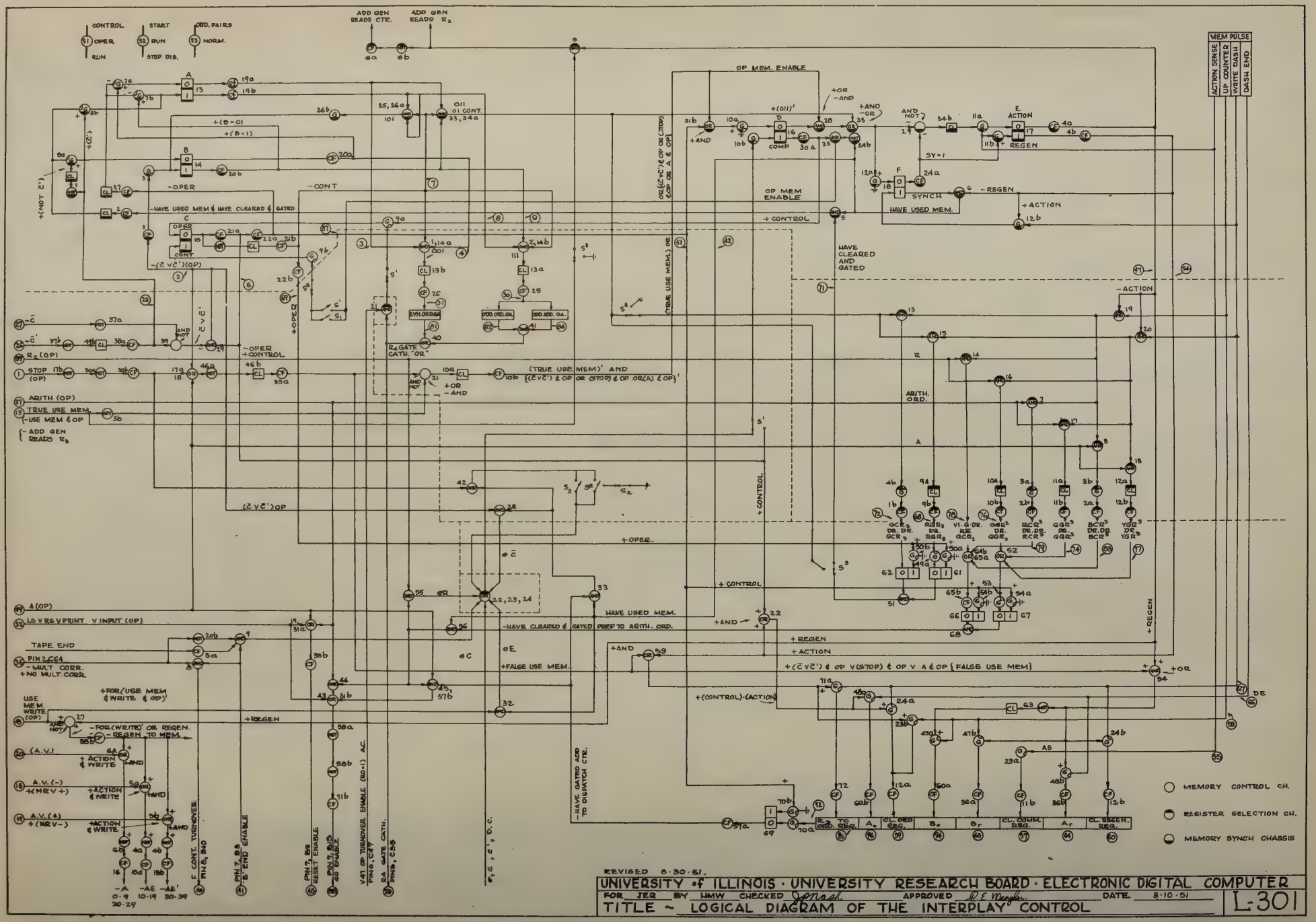
LATEST REVISION ~ 9·10·51

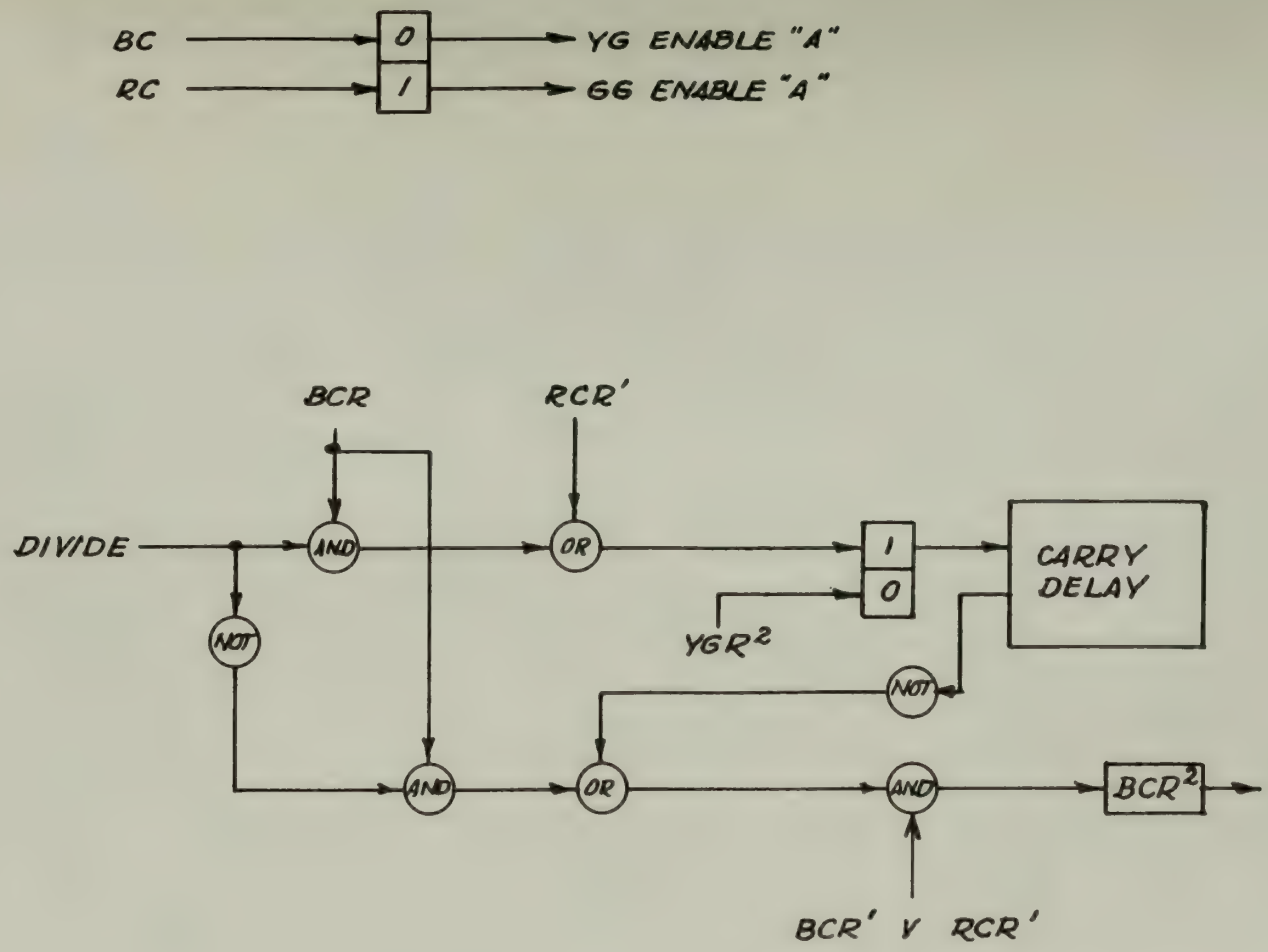
· UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER ·

FOR E.L.H. BY HW CHECKED C.B.R. APPROVED R. E. Meagher DATE 5·31·51

TITLE ~ LOGICAL DIAGRAM OF ARITHMETIC CONTROL

M·300


CONTROL
START
ORD. PAIRS
OPER.
RUN
RUN
NORM.
STOP DIS.
ADD GEN READS CTR.
ADD GEN READS R2
MEM PULSE
ACTION SENSE
UP COUNTER
WRITE DASH
DASH END
OP MEM. ENABLE
+CONTROL
HAVE CLEARED AND GATED
HAVE USED MEM.
-ACTION
+REGEN
-REGEN
+ACTION
-OPER
-CONT
-HAVE USED MEM & HAVE CLEARED & GATED
+OPER
+(B-0)
+(B-1)
011 01 CONT.
R4 GATE CATH. "OR"
(TRUE USE MEM)' AND {(C̄ ∨ C')' & OP OR (STOP) & OP OR(A) & OP}'
ARITH. ORD.
-HAVE CLEARED & GATED PREP TO ARITH. ORD.
+FALSE USE MEM.
+(CONTROL)·(ACTION)
+(C̄ ∨ C')' & OP V(STOP) & OP V A & OP {FALSE USE MEM}
-HAVE GATED ADD TO DISPATCH CTR.
MEMORY CONTROL CH.
REGISTER SELECTION CH.
MEMORY SYNCH CHASSIS
REVISED 8-30-51.
UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER
FOR JER BY HMW CHECKED Spnash. APPROVED R.E. Meagher DATE 8-10-51
TITLE ~ LOGICAL DIAGRAM OF THE INTERPLAY CONTROL
L-301

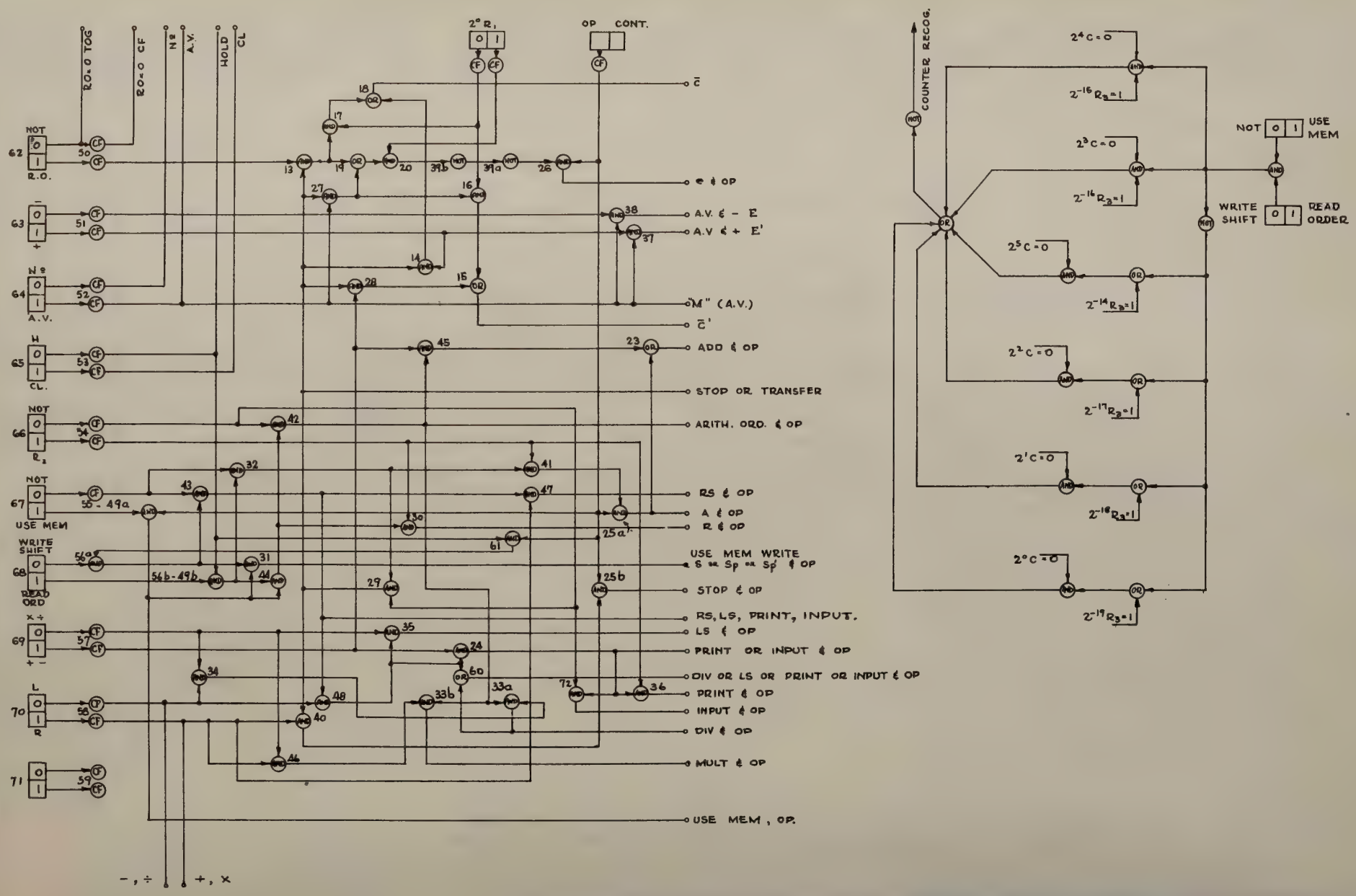


UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER

FOR ELH BY HMW CHECKED ELH APPROVED R. E. Meagher DATE 6·6·51

TITLE ~ LOGICAL DIAGRAM OF DELAY SELECTOR

S-302



UNIVERSITY of ILLINOIS · UNIVERSITY RESEARCH BOARD · ELECTRONIC DIGITAL COMPUTER

FOR JPN BY HMW CHECKED J.P.Nash. APPROVED R.E. Meagher. DATE 6-11-51

TITLE ~ DECODING LOGIC & RECOGNITION CKT.

M-305

DECODING REGISTER CODE

FLIPFLOP	G2	G3	G4	G5	G6	G7	G8	G9	70	71
1	ROUND OFF	+	A.V.	CLEAR	R_2	USE MEM	READ ORD.	+ −	R	
0	NOT	−	NO.	HOLD	NOT	NOT	WRITE SHIFT	X ÷	L	
+	0	1/0	1/0	1/0.	0.	1.	1.	1.	1	−
X	1/0	1	0	1/0.	0.	1.	1.	0.	1.	−
÷	0	1	1	1/0.	0.	1.	1.	0.	0.	−
→	1/0	−	−	1/0.	−	0.	0.	−	1.	−
←	1/0	−	−	1/0.	−	0.	0.	0.	0.	−
R	0	−	−	1/0.	1.	1.	1.	1	−	−
A	0	1/0	1/0	1/0.	1.	0.	1.	−	1	−
U'	0	0	0	1/0.	0.	0.	1.	1.	−	−
C'	0	0	1.	1/0.	0.	0.	1.	0	−	−
U	0	1.	0	0.	0.	0.	1.	0	−	−
C	1.	0	0	0.	0.	0.	1.	0	−	−
M	1/0	−	0.	1/0.	−	1.	0.	−	−	−
E	1/0	1.	1.	1/0.	−	1.	0.	−	−	−
E'	0	0.	1.	1/0.	−	1.	0.	−	−	−
Z	0	0	0	1/0.	0.	0.	1.	0	1.	−
P	−	−	−	−.	1.	0.	0.	1.	0.	
T	−	−	−	−.	0.	0.	0.	1.	0.	

FLIPFLOPS MARKED ARE SENSED, OTHERS MERELY SET.

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FOR JPN BY HMW CHECKED APPROVED J. P. Nash DATE 6·12·51
TITLE ~ DECODING REGISTER CODE S·306

ORDER REGISTER CODE

FLIPFLOP	2^{0}	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}	2^{-7}	2^{-8}	2^{-9}
1	+ −	USE MEM.	READ ORD.	R	ROUND OFF	+	ABS. VAL.	CL.	R_2	
0	X ÷	NOT	WRITE SHIFT	L	NOT	−	Nº	H	NOT	
+	1.	1.	1.	1	0	1/0	1/0	1/0.	0.	
X	0.	1.	1.	1.	1/0	1	0	1/0.	0.	
÷	0.	1.	1.	0.	0	1	1	1/0.	0.	
→	−	0.	0.	1.	1/0	−	−	1/0.	−	
←	0.	0.	0.	0.	0	−	−	1/0.	−	
R	1	1.	1.	−	0	−	−	1/0.	1.	
A	−	0.	1.	1	0	1/0	1/0	1/0.	1.	
U'	1.	0.	1.	−	0	0	0	1/0.	0.	
C'	0	0.	1.	−	0	0	1.	1/0.	0.	
U	0	0.	1.	−	0	1.	0	0.	0.	
C	0	0.	1.	−	1.	0	0	0.	0.	
M	−	1.	0.	−	1/0	−	0.	1/0.	−	
E	−	1.	0.	−	1/0	1.	1.	1/0.	−	
E'	−	1.	0.	−	0	0.	1.	1/0.	−	
Z	0	0.	1.	1.	0	0	0	1/0.	0.	
P	1.	0.	0.	0.	−	−	−	1/0.	1.	
T	1.	0.	0.	0.	−	−	−	1/0.	0.	

FLIPFLOPS MARKED ARE SENSED. OTHERS MERELY SET.

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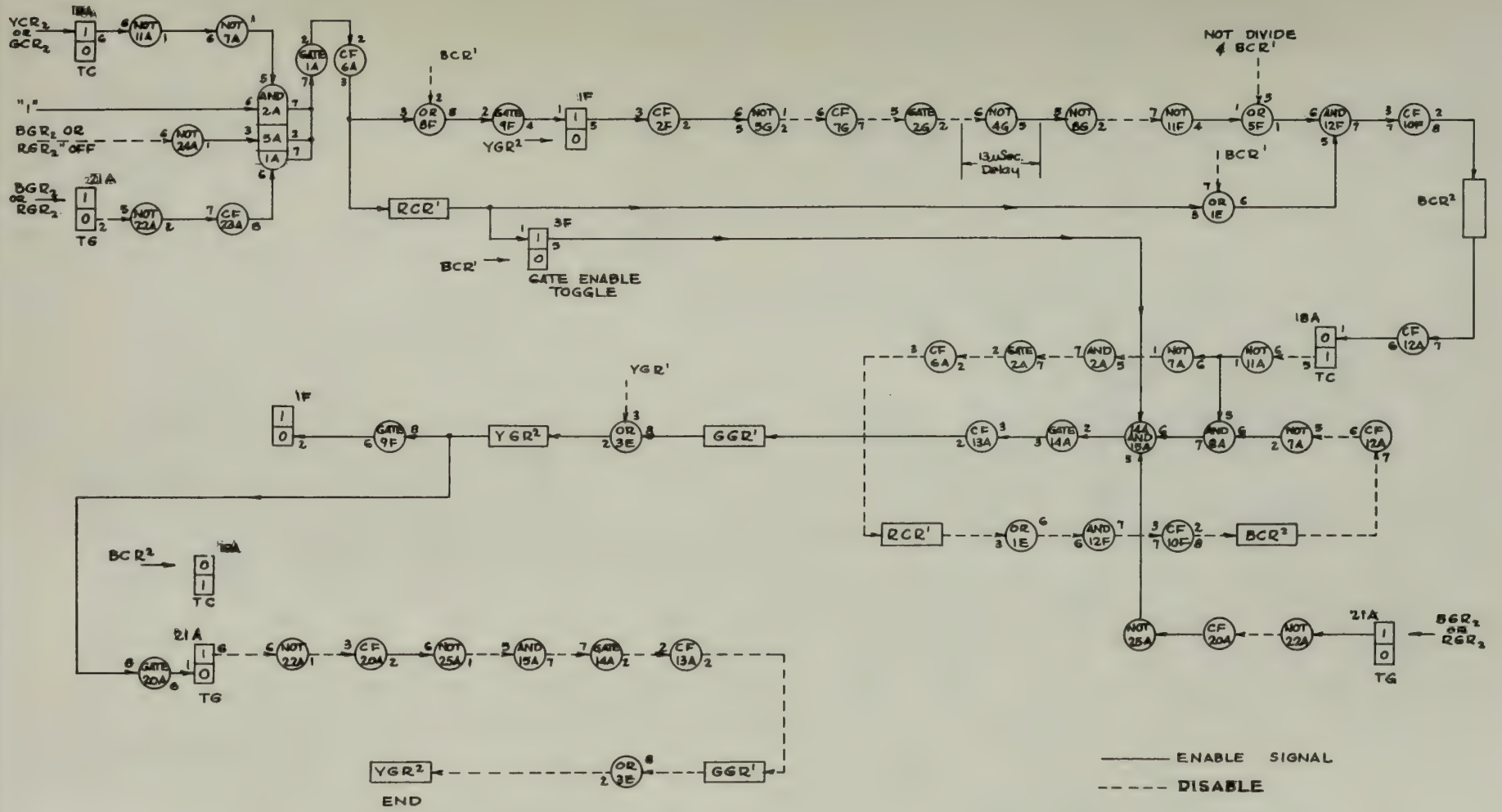
FOR JPN BY HMW CHECKED _____ APPROVED J. Nash DATE 6·12·51

TITLE~ ORDER REGISTER CODE S·307.



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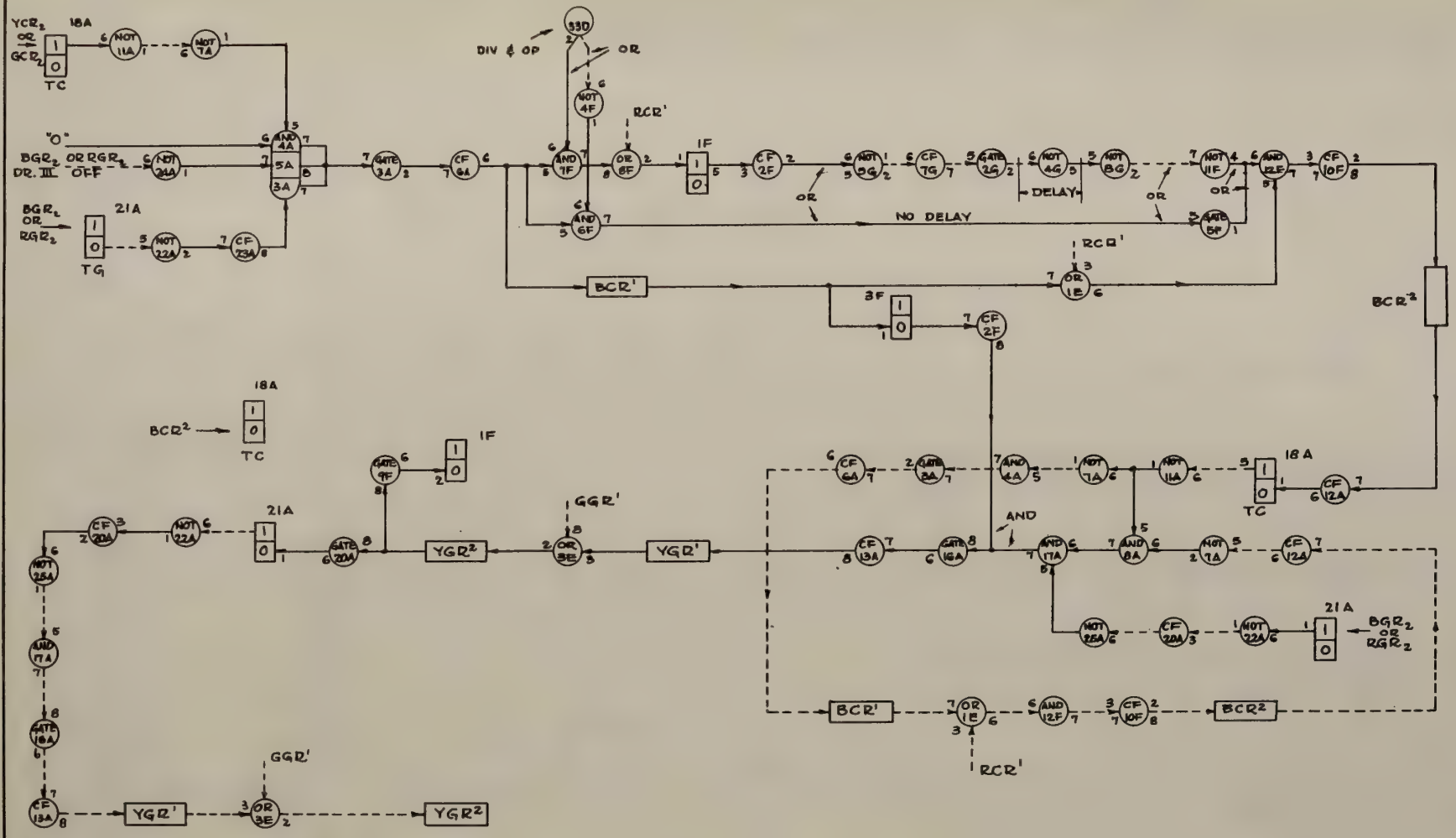
FOR SMK BY HMW CHECKED SMK APPROVED J.P. Nash DATE 7-6-51

TITLE ~ GREEN GATE SEQUENCE

M-312



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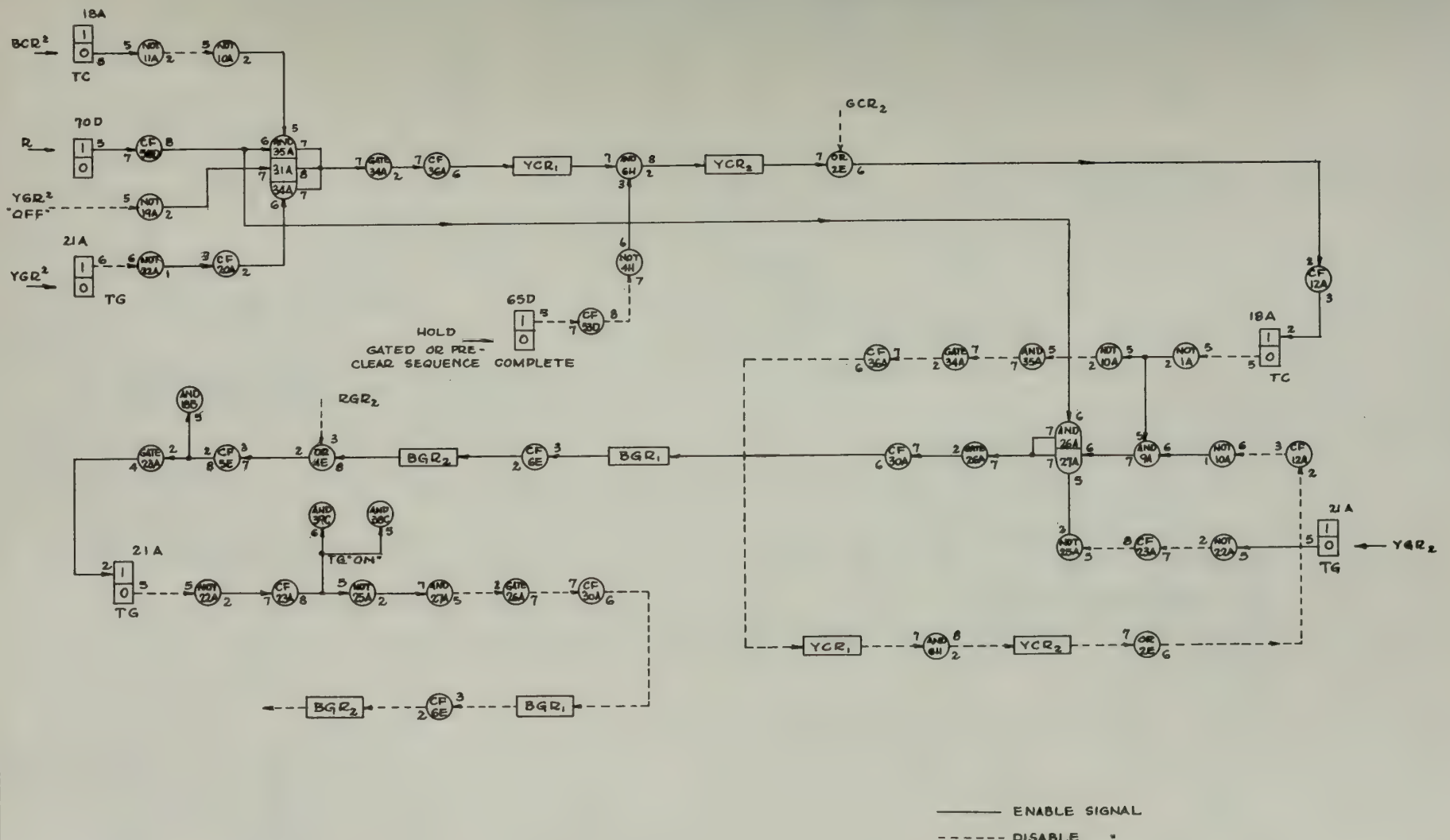
FOR PMK BY HMW CHECKED JMK APPROVED JWMash DATE 7·10·51 M-314

TITLE ~ YELLOW GATE SEQUENCE



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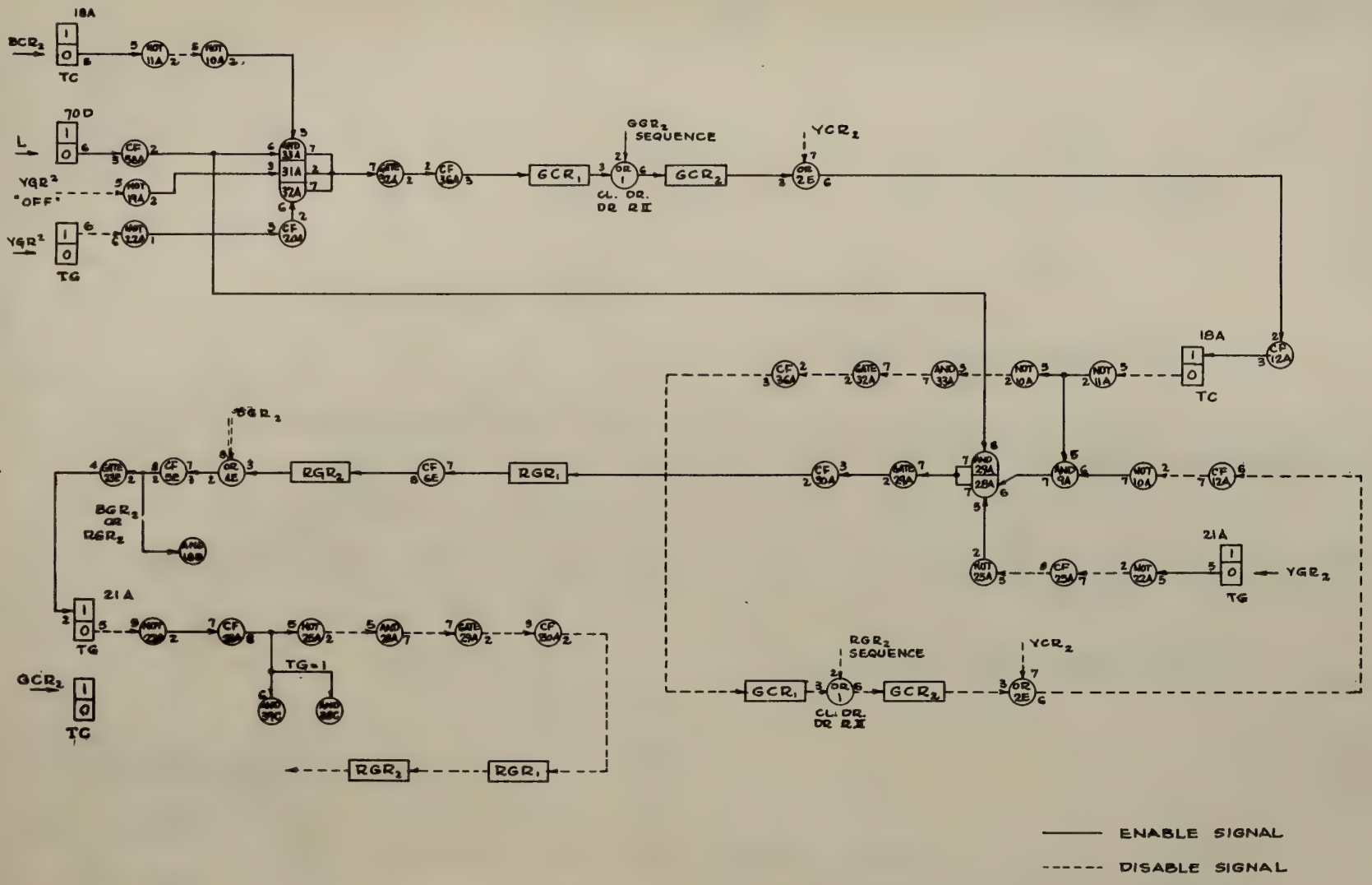
FOR PMK BY HMW CHECKED PMK APPROVED JPMash DATE 7.10.51

TITLE ~ BLACK GATE RI SEQUENCE

M-315



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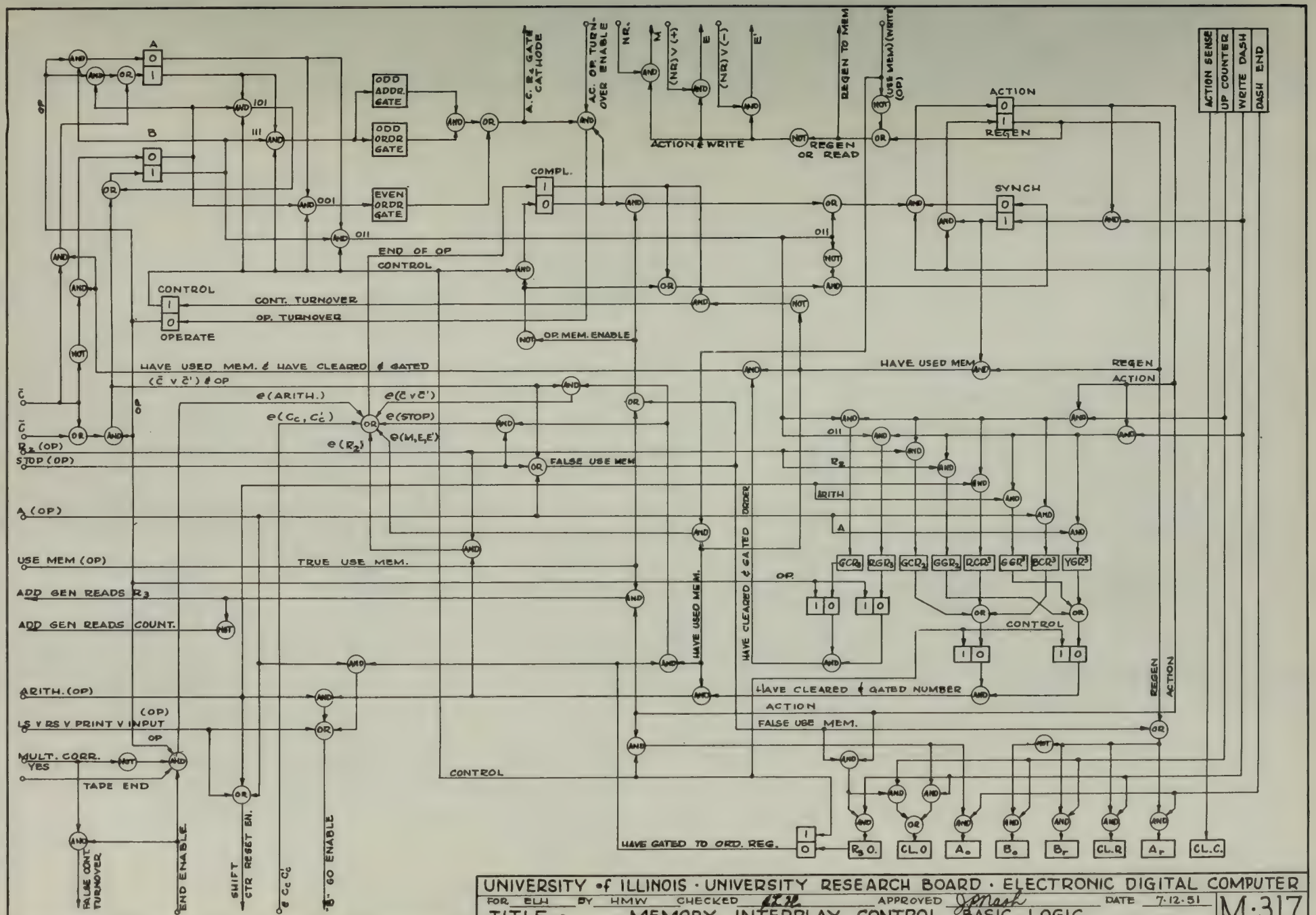
FOR PMK BY HMW CHECKED PMK APPROVED JHNash DATE 7-11-51

TITLE ~ RED GATE RI SEQUENCE

M-316



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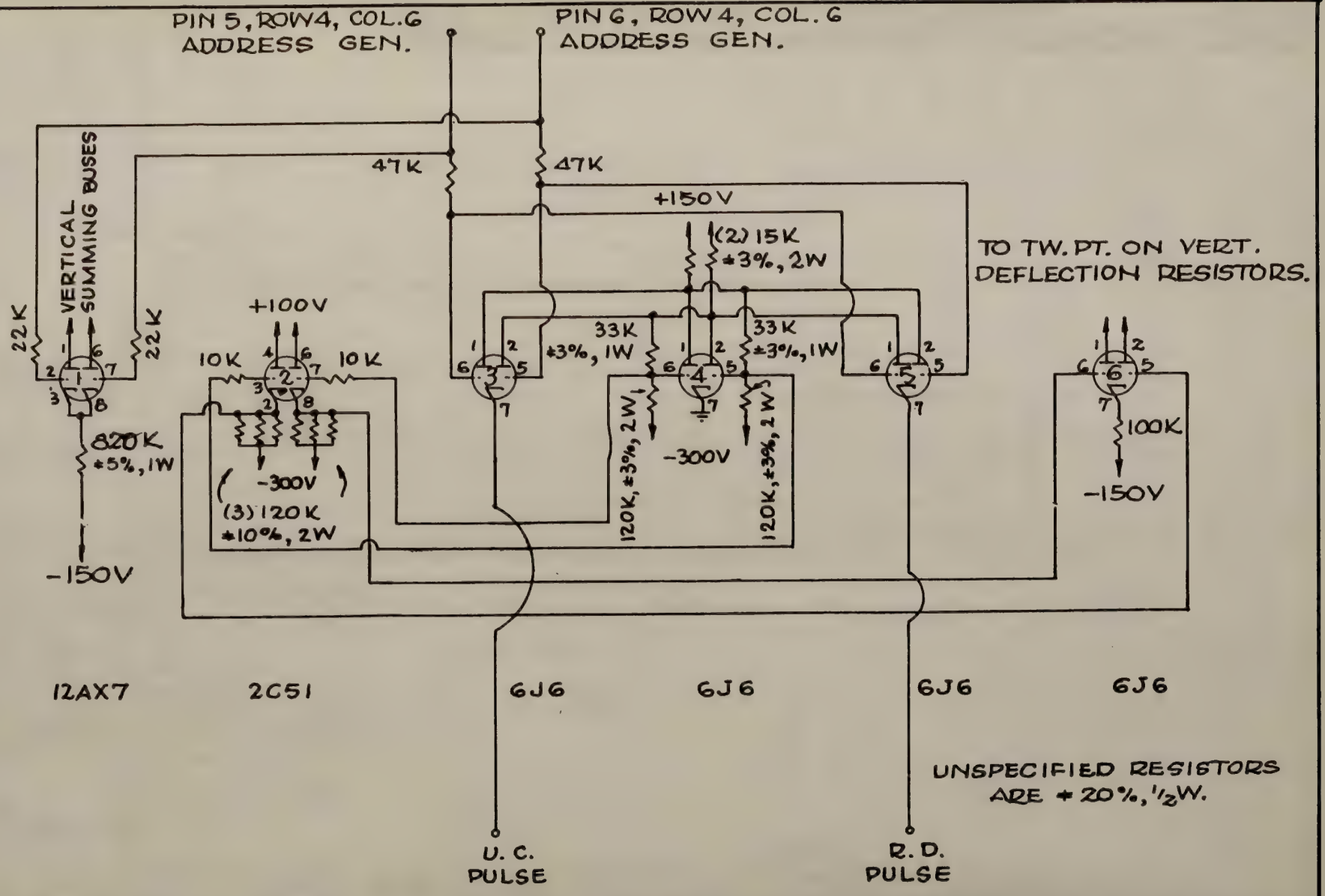
FOR ELH BY HMW CHECKED RR APPROVED JMash DATE 7-12-51

TITLE ~ MEMORY INTERPLAY CONTROL, BASIC LOGIC

M-317



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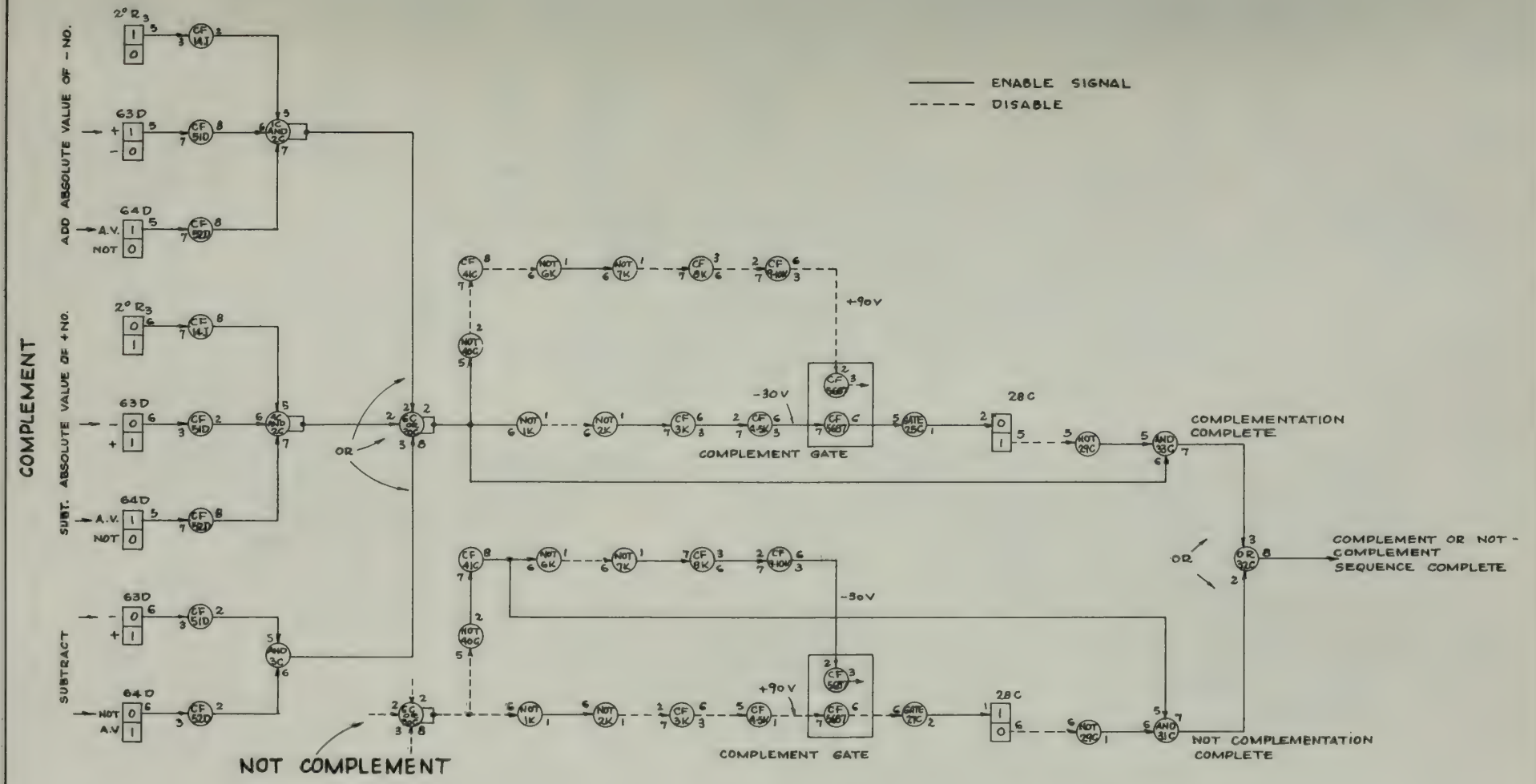
FOR JMW BY HMW CHECKED J.M.W. APPROVED J.P.Nash DATE 7-13-51

TITLE ~ REVERSED TWITCH STAGGER COL'S. GENERATOR

S-318



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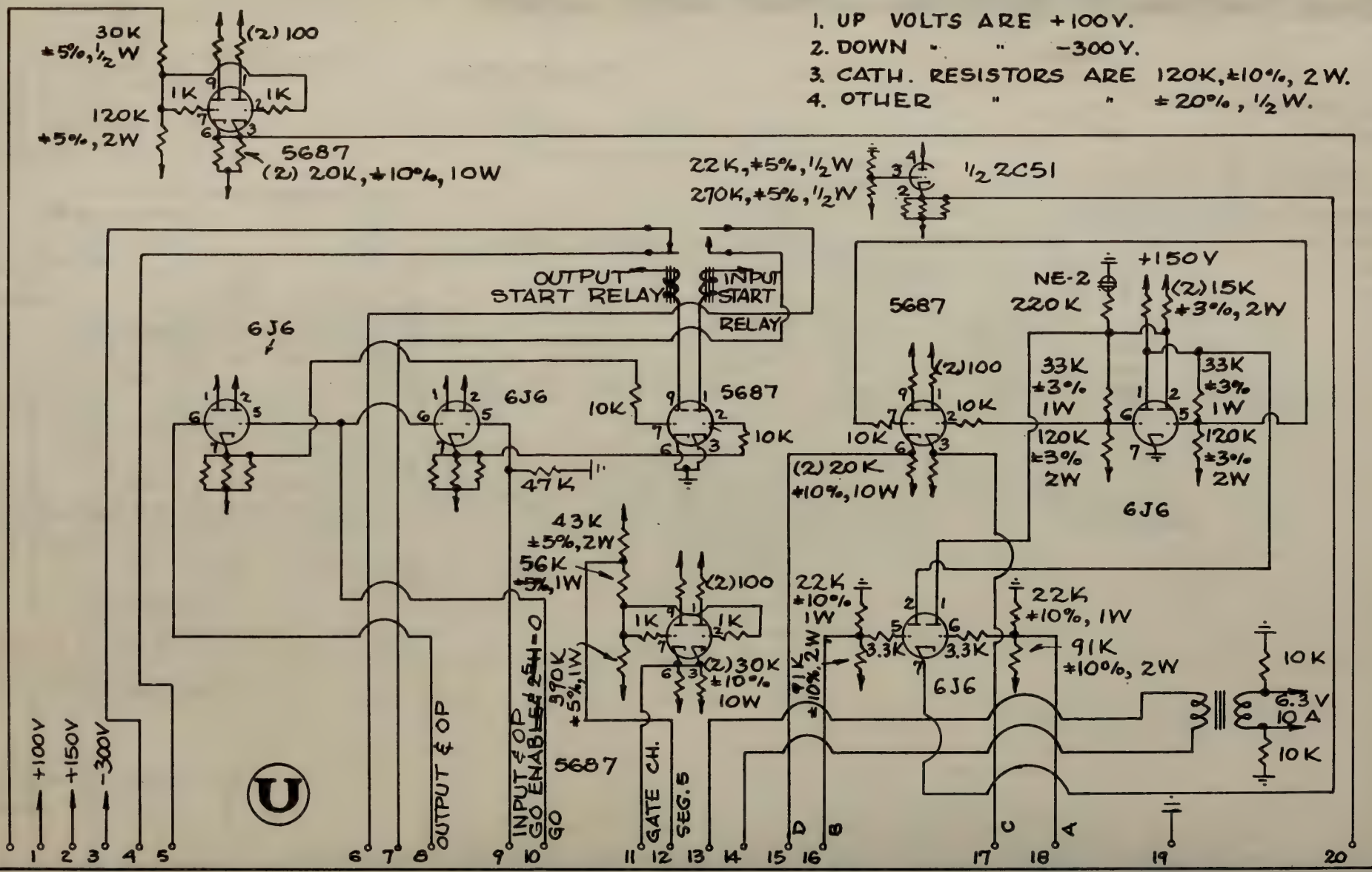
FOR PMK BY HMW CHECKED GMK APPROVED JPMash DATE 7-16-51

TITLE – COMPLEMENT OR NOT COMPLEMENT SEQUENCE

M-319

WHEN NOT SPECIFIED:

1. UP VOLTS ARE +100V.
2. DOWN " " -300V.
3. CATH. RESISTORS ARE 120K, ±10%, 2W.
4. OTHER " " ±20%, 1/2W.



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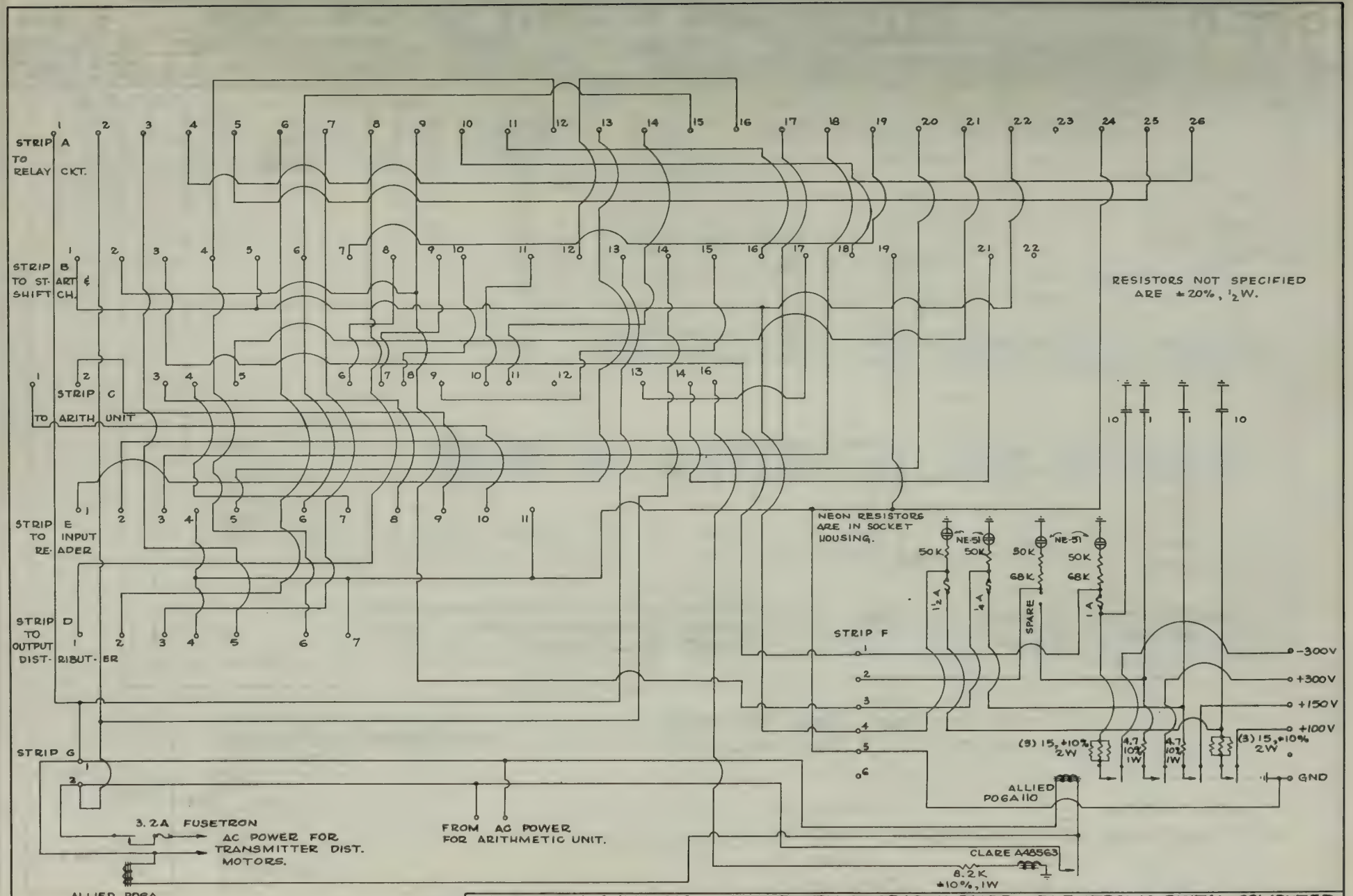
FOR T.S. BY HMW CHECKED T. SHAPIN APPROVED R. E. Meagher DATE 7-25-51

TITLE ~ INPUT OUTPUT START & SHIFT CHASSIS I

S-326



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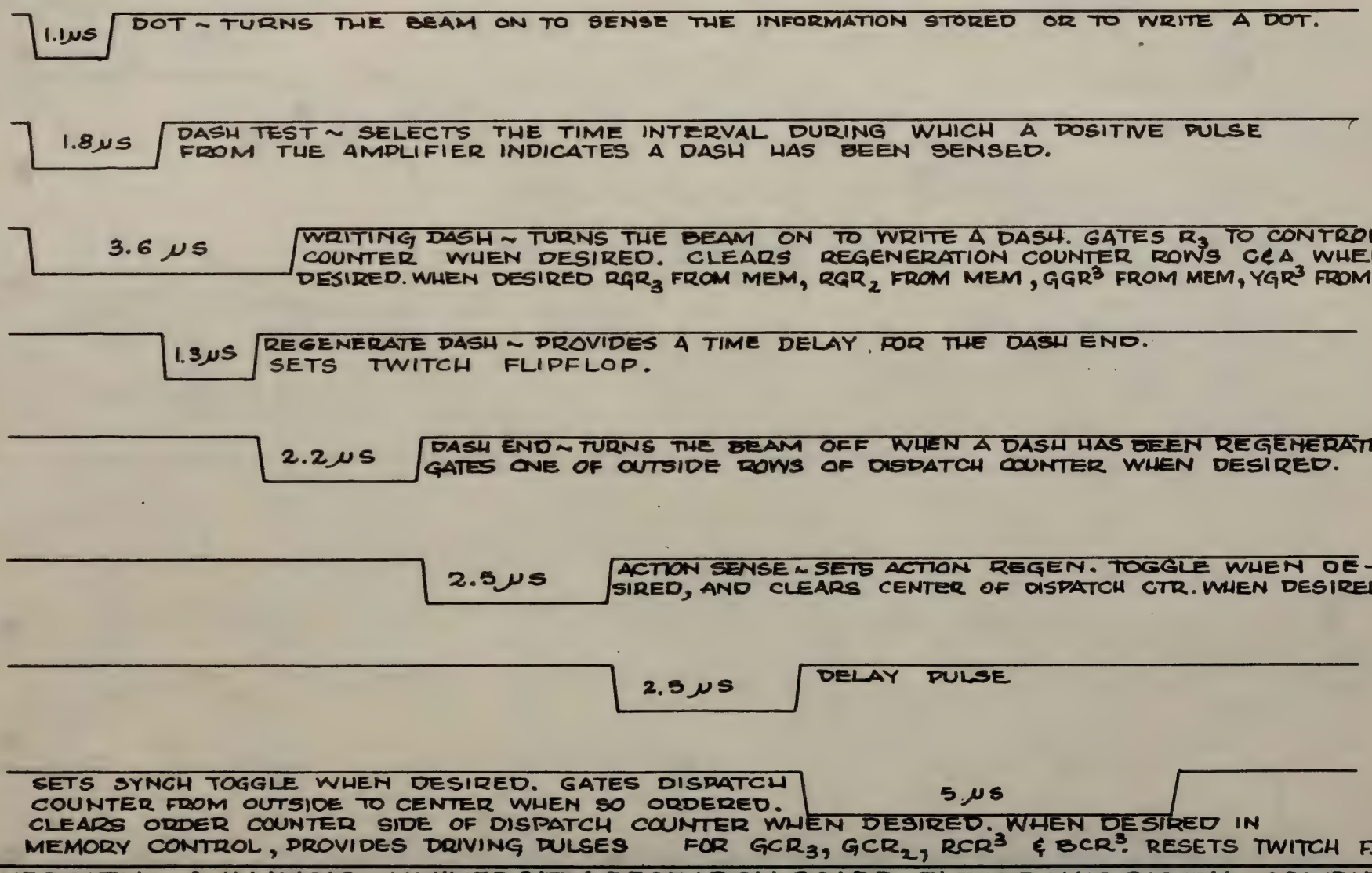
FOR TS BY HMW CHECKED T. SHAPIN APPROVED R E Meagher DATE 7-27-51

TITLE – INTERCONNECTION CHASSIS

M-327

~ ALL PULSES GO FROM +10V TO −10V.


1.1μs
DOT ~ TURNS THE BEAM ON TO SENSE THE INFORMATION STORED OR TO WRITE A DOT.
1.8μs
DASH TEST ~ SELECTS THE TIME INTERVAL DURING WHICH A POSITIVE PULSE FROM THE AMPLIFIER INDICATES A DASH HAS BEEN SENSED.
3.6 μs
WRITING DASH ~ TURNS THE BEAM ON TO WRITE A DASH. GATES R_3 TO CONTROL COUNTER WHEN DESIRED. CLEARS REGENERATION COUNTER ROWS C¢A WHEN DESIRED. WHEN DESIRED RGR_3 FROM MEM, RGR_2 FROM MEM, GGR^3 FROM MEM, YGR^3 FROM R_2.
1.3μs
REGENERATE DASH ~ PROVIDES A TIME DELAY FOR THE DASH END. SETS TWITCH FLIPFLOP.
2.2μs
DASH END ~ TURNS THE BEAM OFF WHEN A DASH HAS BEEN REGENERATED GATES ONE OF OUTSIDE ROWS OF DISPATCH COUNTER WHEN DESIRED.
2.5μs
ACTION SENSE ~ SETS ACTION REGEN. TOGGLE WHEN DESIRED, AND CLEARS CENTER OF DISPATCH CTR. WHEN DESIRED
2.5μs
DELAY PULSE
5μs
SETS SYNCH TOGGLE WHEN DESIRED. GATES DISPATCH COUNTER FROM OUTSIDE TO CENTER WHEN SO ORDERED. CLEARS ORDER COUNTER SIDE OF DISPATCH COUNTER WHEN DESIRED. WHEN DESIRED IN MEMORY CONTROL, PROVIDES DRIVING PULSES FOR GCR_3, GCR_2, RCR^3 ¢ BCR^3. RESETS TWITCH F.FLOP.

ORDVAC

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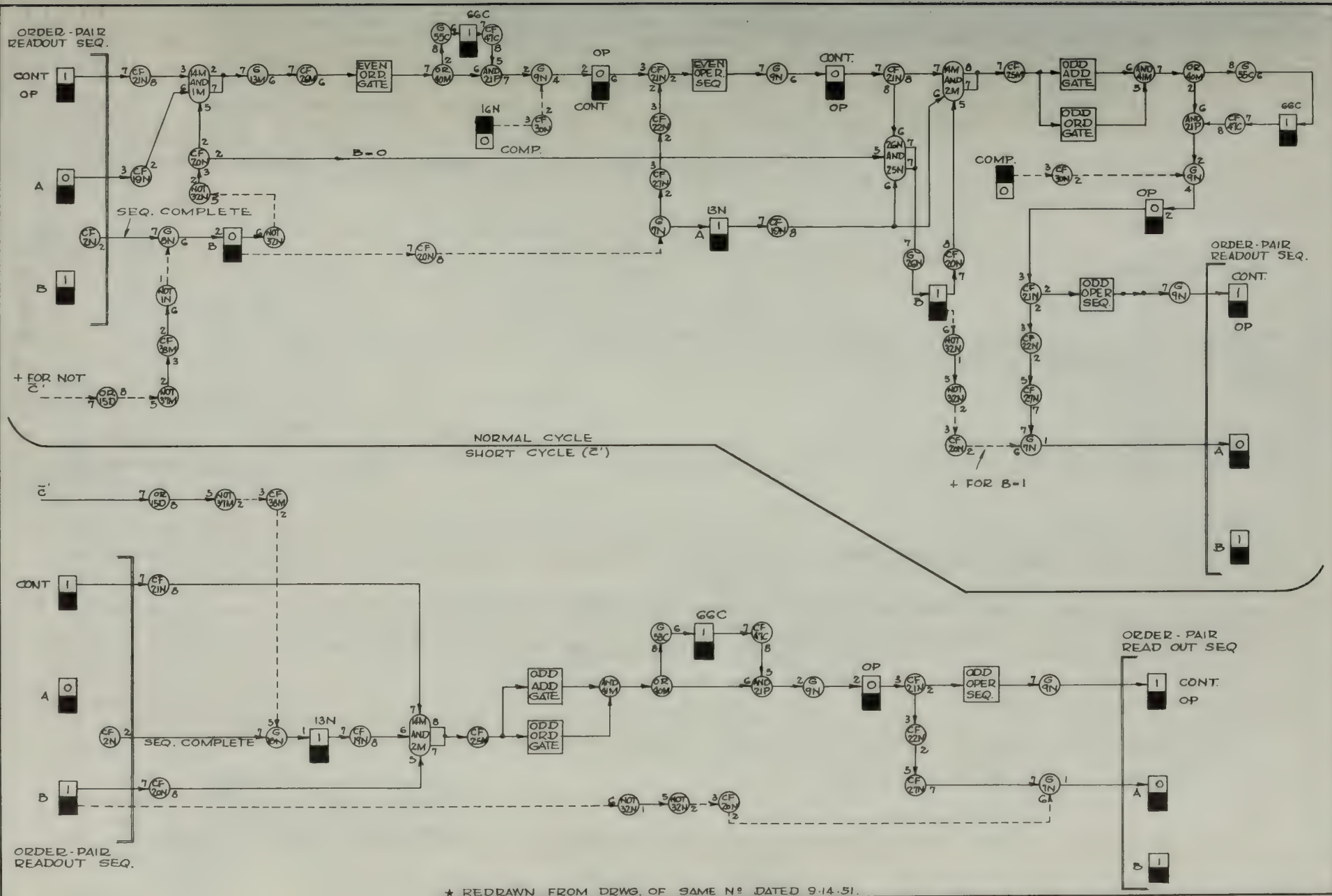
FOR JMW BY HMW CHECKED J. M. W. APPROVED R. E. Meagher DATE 8·16·51

TITLE IDEALIZED PULSES FOR MEMORY

S·333



★ REDRAWN FROM DRWG. OF SAME Nº DATED 9-14-51.

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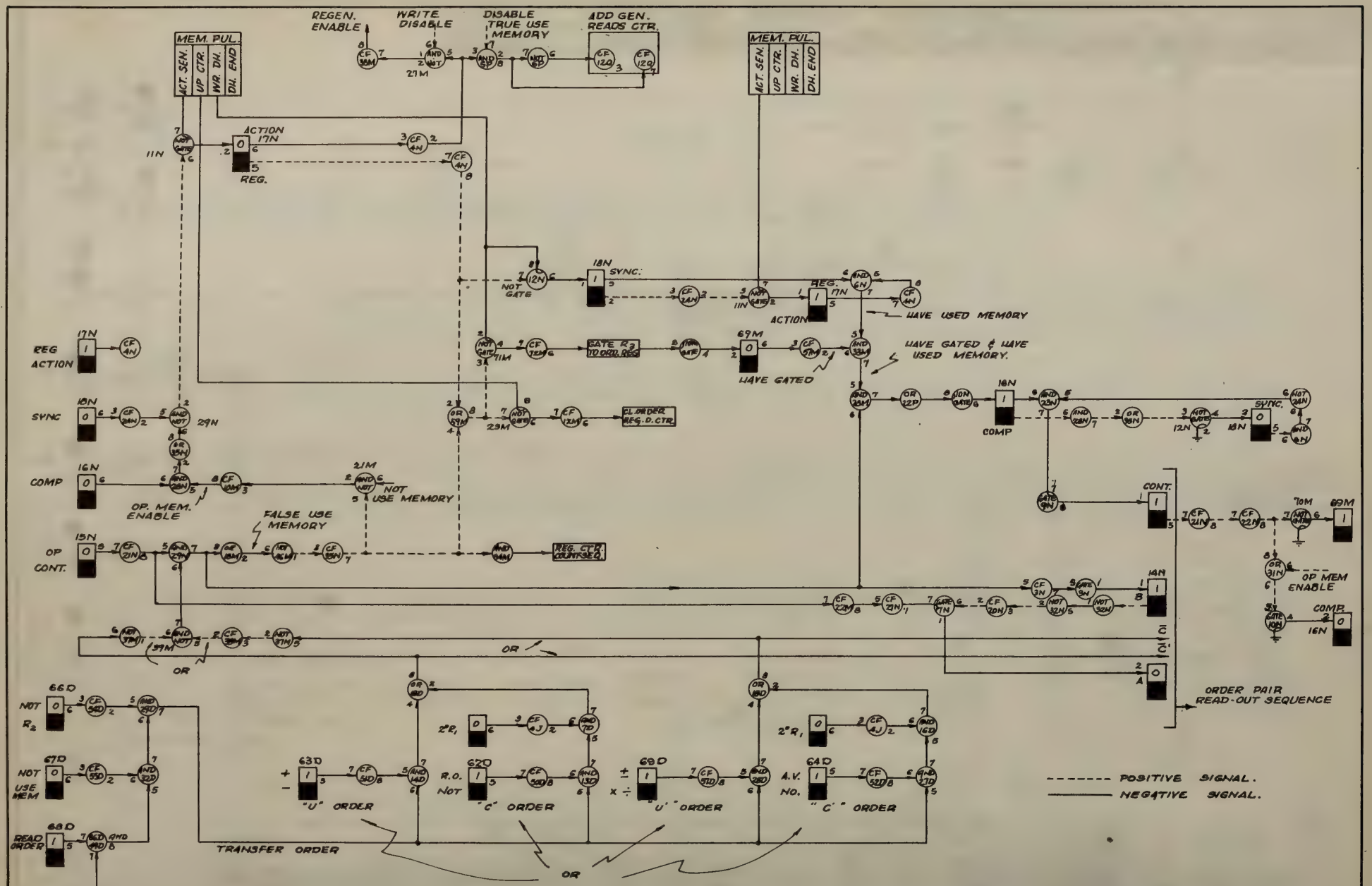
FOR PMK BY HMW CHECKED JWK APPROVED R. E. Meagher DATE 7-7-51

TITLE ~ BASIC CYCLE SEQUENCE

M-338



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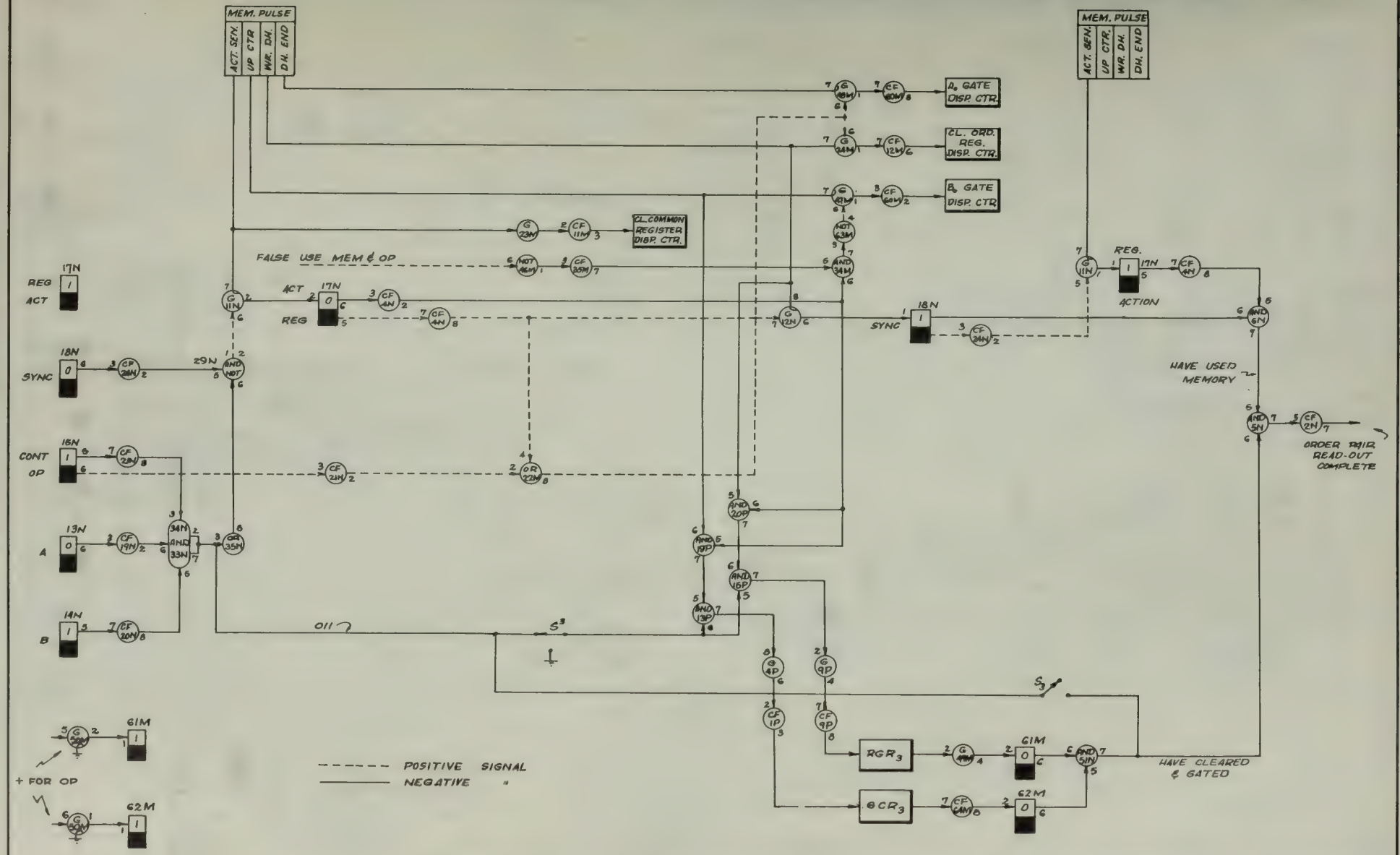
FOR PMK BY HMW CHECKED PMK APPROVED JHMash DATE 9-17-51

TITLE TRANSFER CONTROL OPERATION SEQUENCE

M-339



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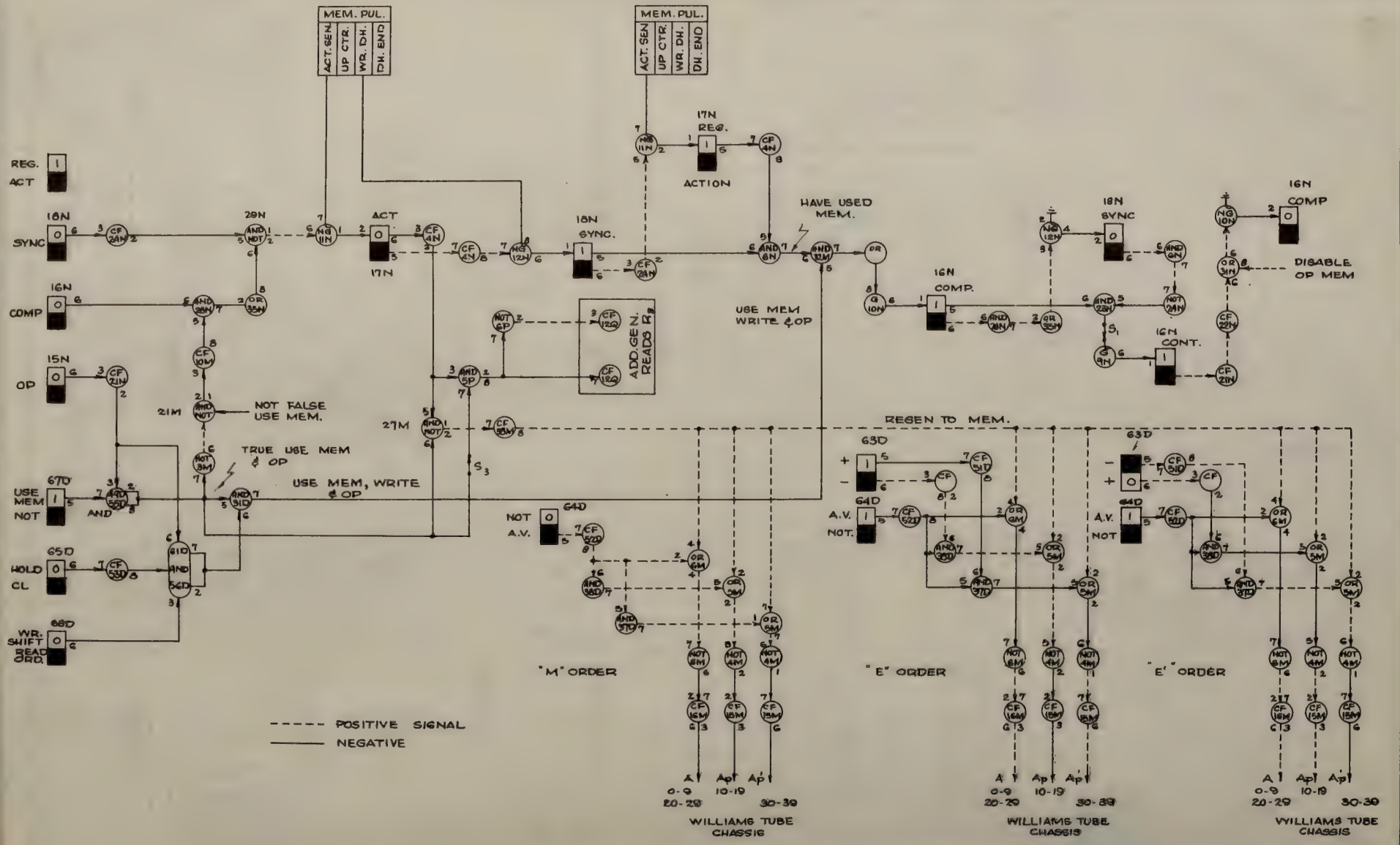
FOR PMK BY HMW CHECKED BMK APPROVED R. E. Meagher DATE 9-19-51

TITLE ~ ORDER PAIR READ-OUT SEQUENCE

M-340



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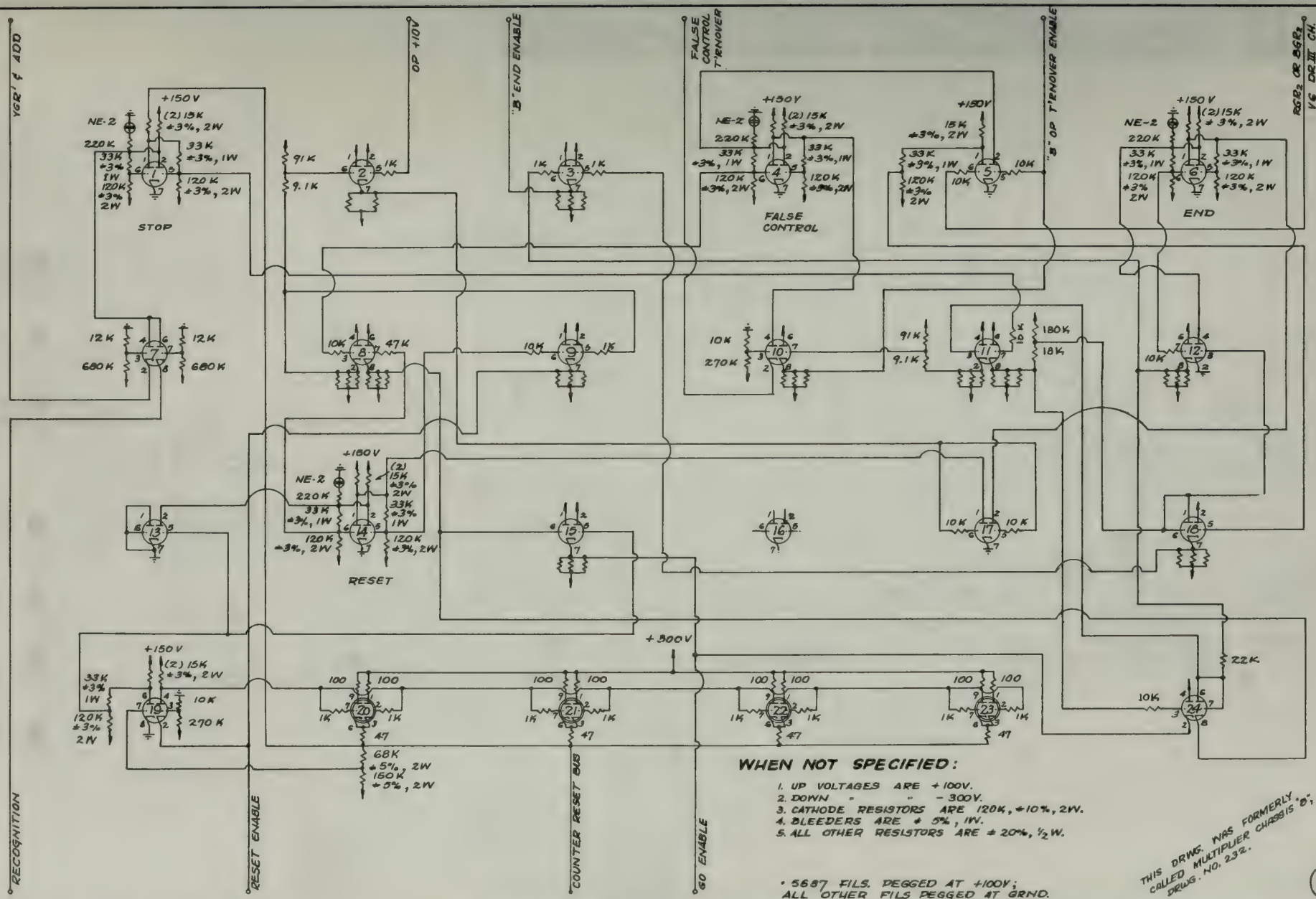
FOR PMK BY HMW CHECKED PMK APPROVED R. E. Meagher DATE

TITLE ~ STORE OPERATION SEQUENCE

M-341



WHEN NOT SPECIFIED:

1. UP VOLTAGES ARE +100V.
2. DOWN " " -300V.
3. CATHODE RESISTORS ARE 120K, ±10%, 2W.
4. BLEEDERS ARE ± 5%, 1W.
5. ALL OTHER RESISTORS ARE ± 20%, ½ W.

• 5687 FILS. PEGGED AT +100V; ALL OTHER FILS PEGGED AT GRND.

THIS DRWG. WAS FORMERLY CALLED MULTIPLIER CHASSIS "D"; DRWG. NO. 232.

B

5687 2C51 6J6

• REDRAWN FROM DRWG OF SAME NO. DATED 1-31-51. REVISED 9-21-51.

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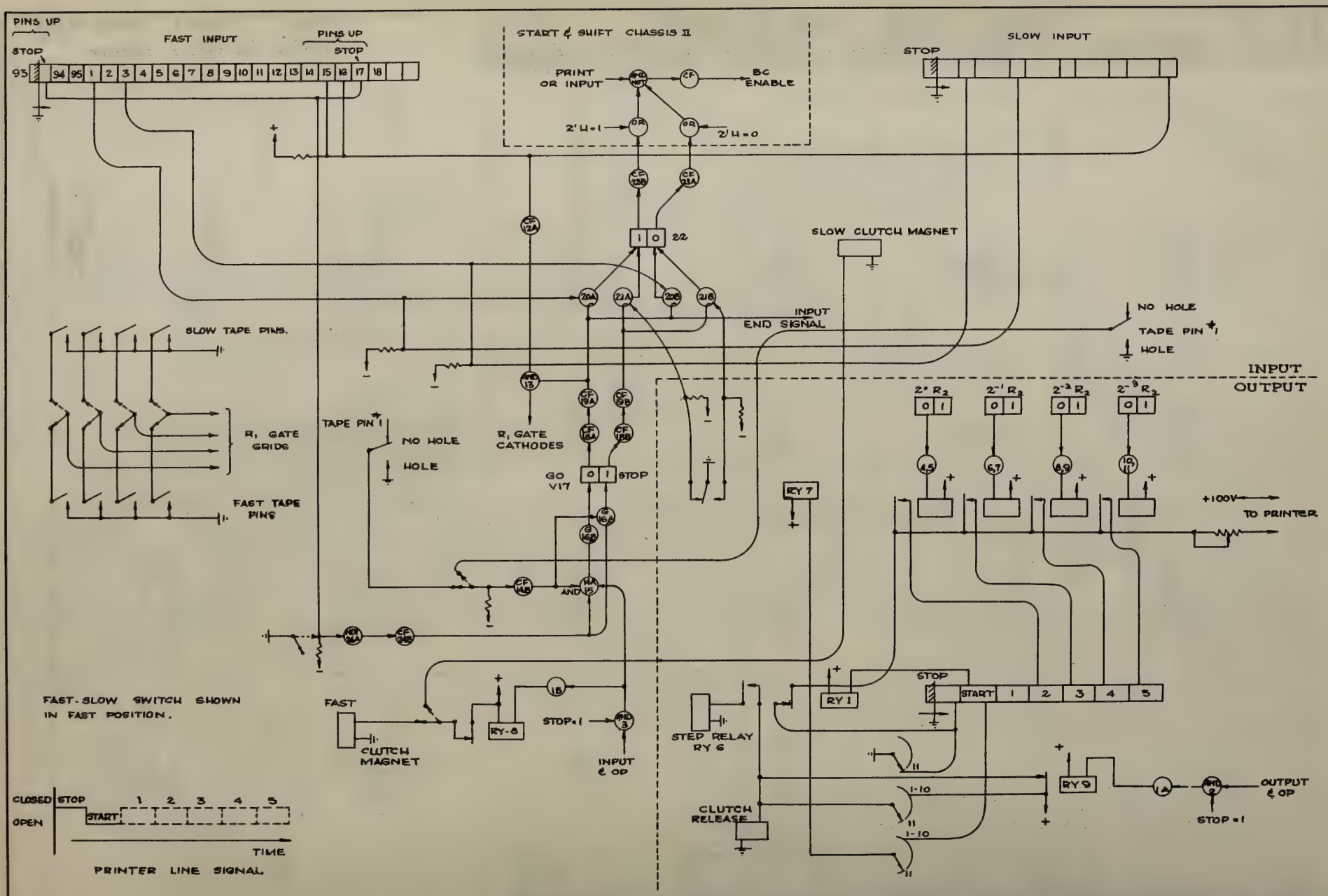
FOR JPN BY HMW CHECKED JPNash APPROVED R E Meagher DATE 9-5-51

TITLE — ARITHMETIC STOP CHASSIS

M-343



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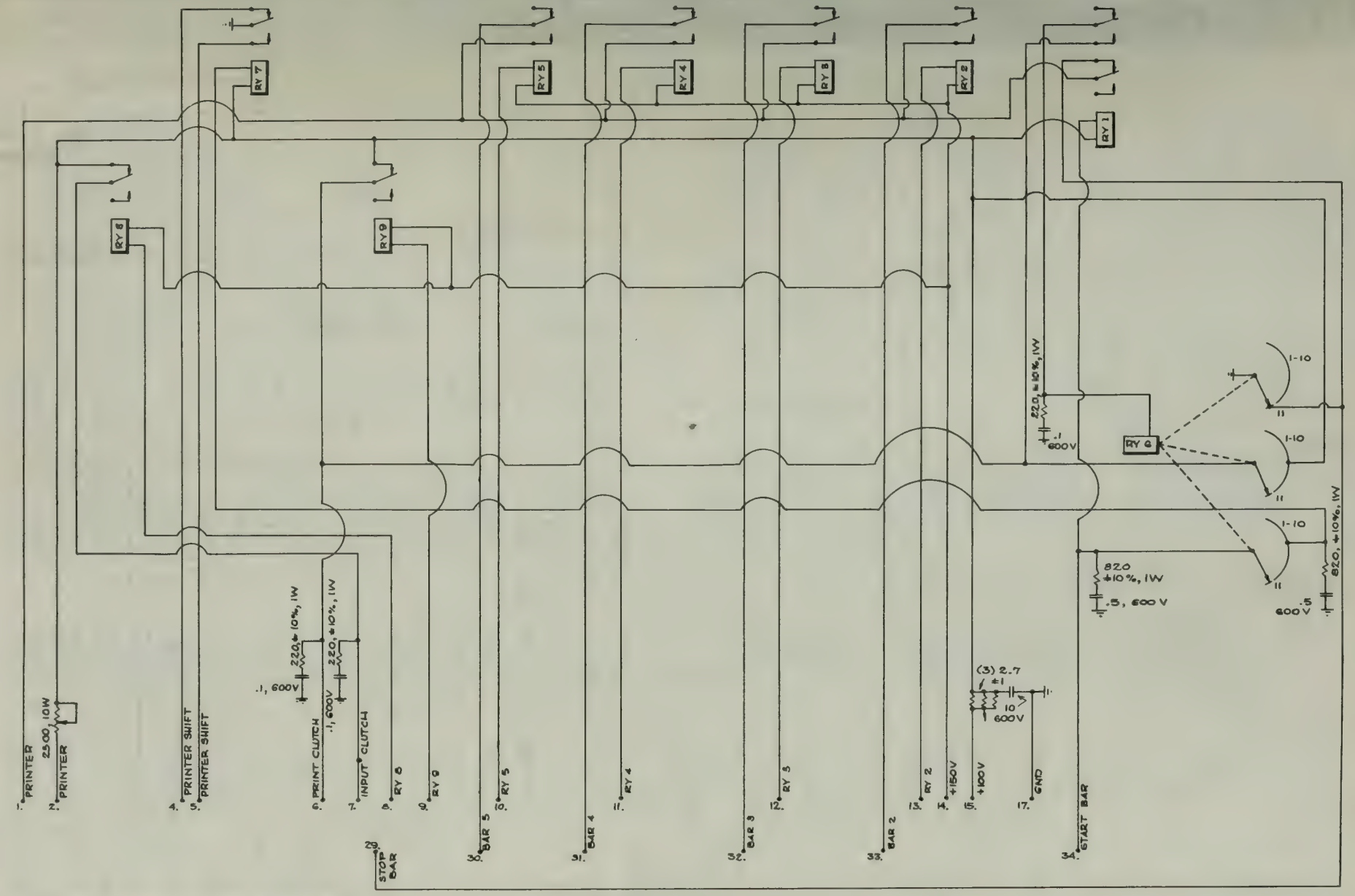
FOR T.S. BY HMW CHECKED T. SHAPIN APPROVED R.E. Meagher DATE 1-24-51

TITLE ~ INPUT - OUTPUT SCHEMATIC

M-344



RY 1:	AUTO-ELEC.	Z17263	BQA	1100 Ω	100V
RY'S 2·3·4·5 & 7:	AUTO-ELEC.	Z17262	BQA	1100 Ω	100V
RY 6 · ·		D87855	B12	600 Ω	115V
RY'S 8,9	CLARE	A48563		6500Ω	10MA

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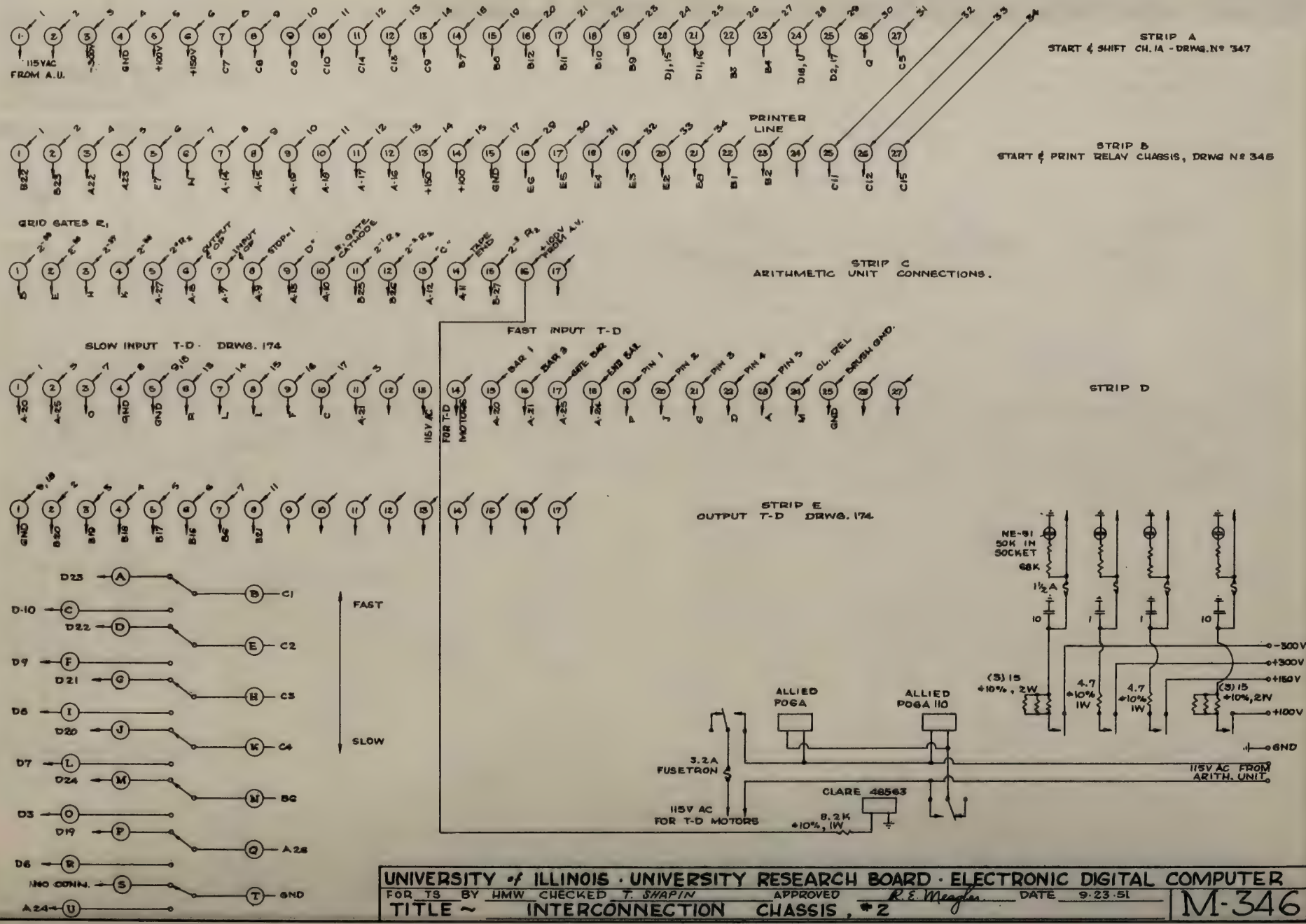
FOR T.S. BY HMN CHECKED T. SHAPIN APPROVED R. E. Meagher DATE 9-22-51

TITLE ~ START & PRINT RELAY CHASSIS

M-345



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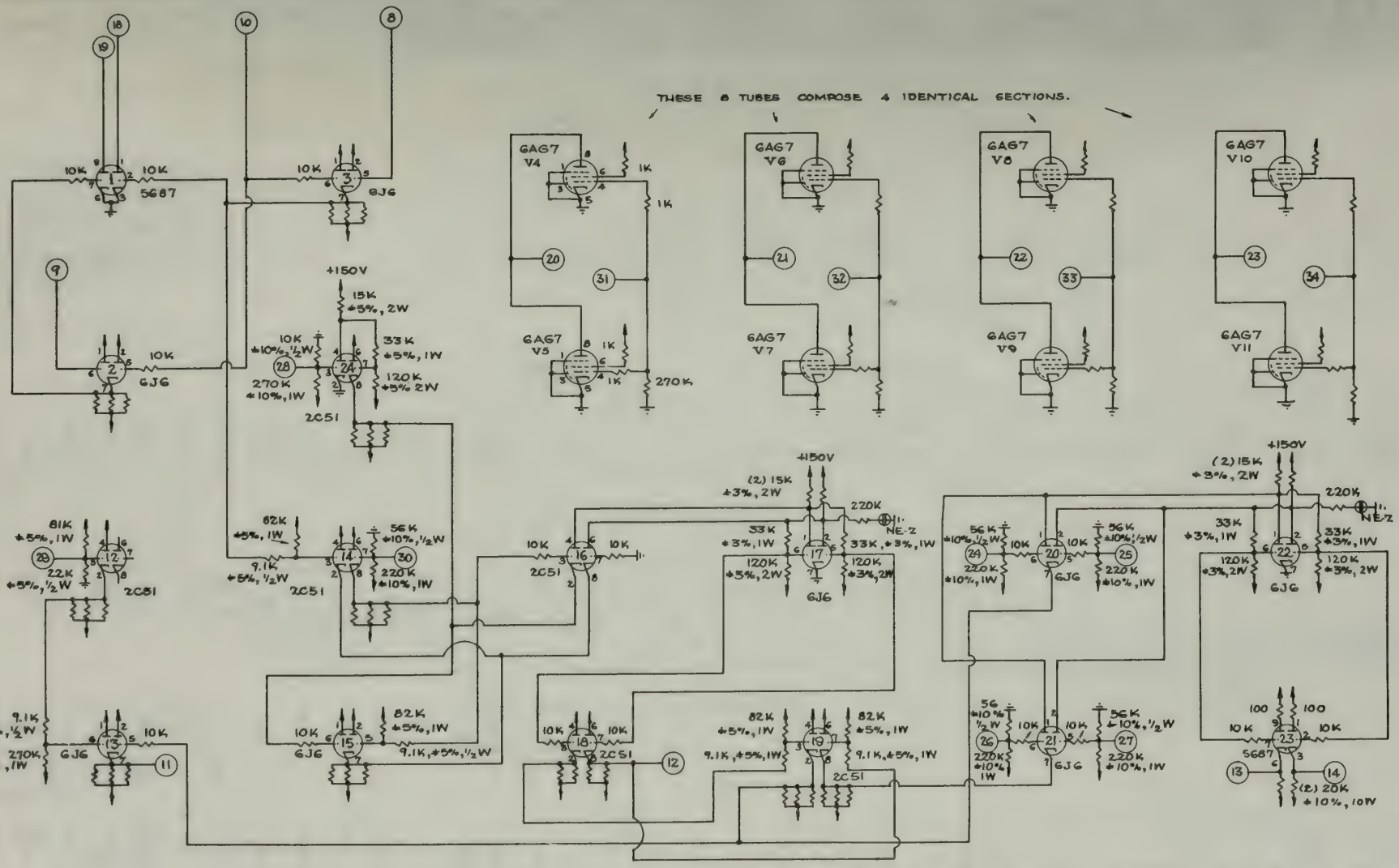
FOR TS BY HMW CHECKED T. SHAPIN APPROVED R. E. Meagher DATE 9·23·51

TITLE ~ INTERCONNECTION CHASSIS, #2

M-346



WHEN NOT SPECIFIED:

1. UP VOLTAGES ARE +100V.
2. DOWN " " -300V.
3. CATHODE RESISTORS ARE 120K, ±10%, 2W.
4. OTHER RESISTORS ARE ± 20%, ½W.

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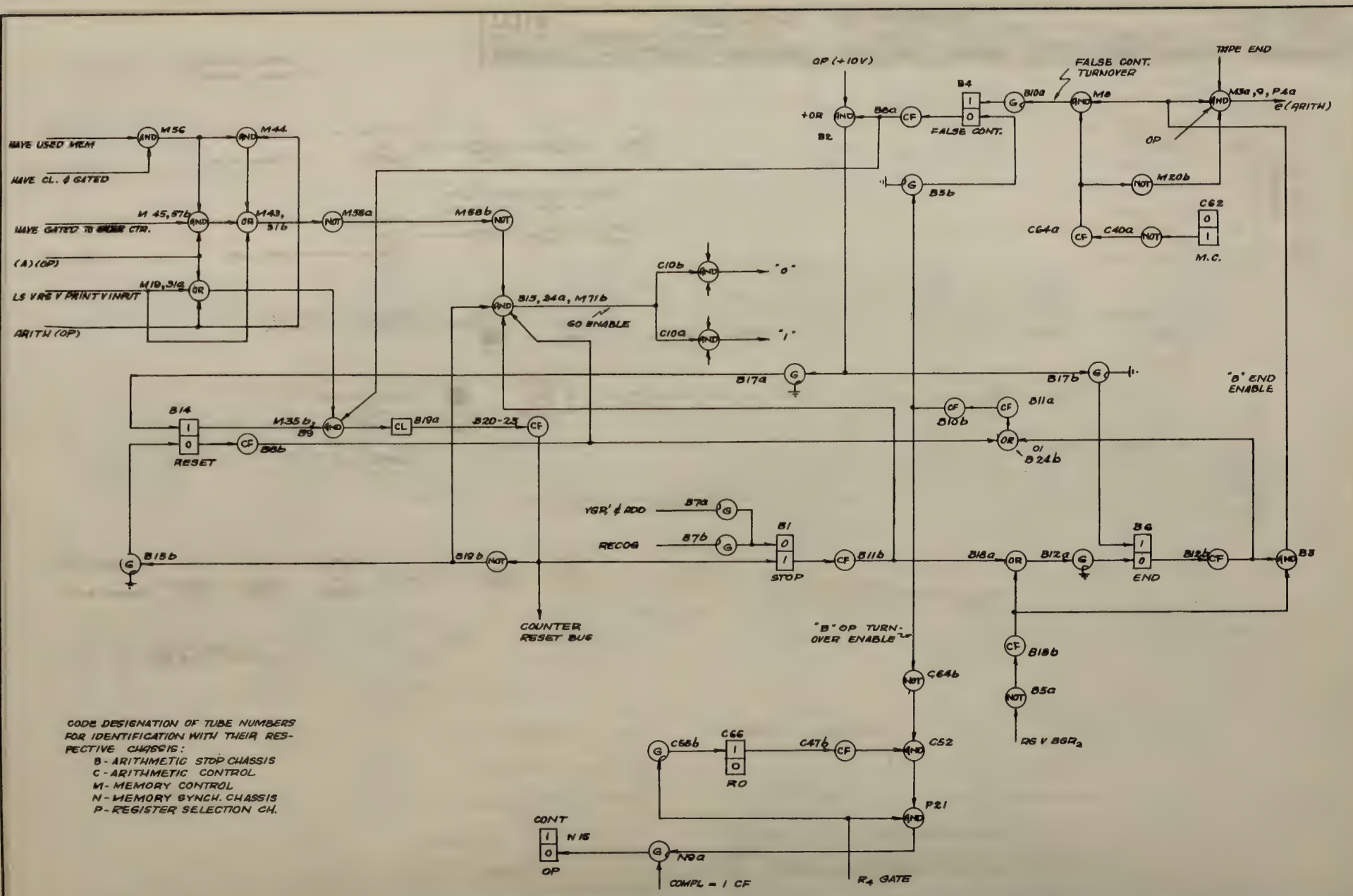
FOR TS BY HMW CHECKED T SHAPIN APPROVED R.E. Meagher DATE 9-27-51

TITLE ~ START & SHIFT CHASSIS IA

M-347



CODE DESIGNATION OF TUBE NUMBERS FOR IDENTIFICATION WITH THEIR RESPECTIVE CHASSIS:

B - ARITHMETIC STOP CHASSIS
C - ARITHMETIC CONTROL
M - MEMORY CONTROL
N - MEMORY SYNCH. CHASSIS
P - REGISTER SELECTION CH.

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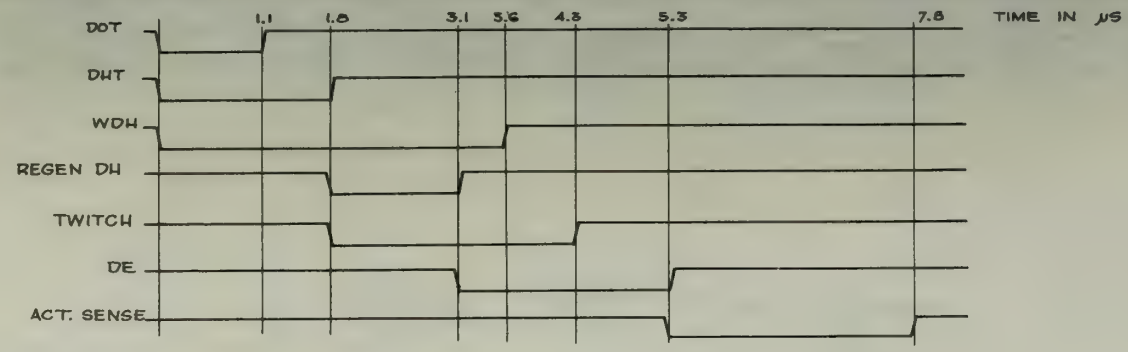
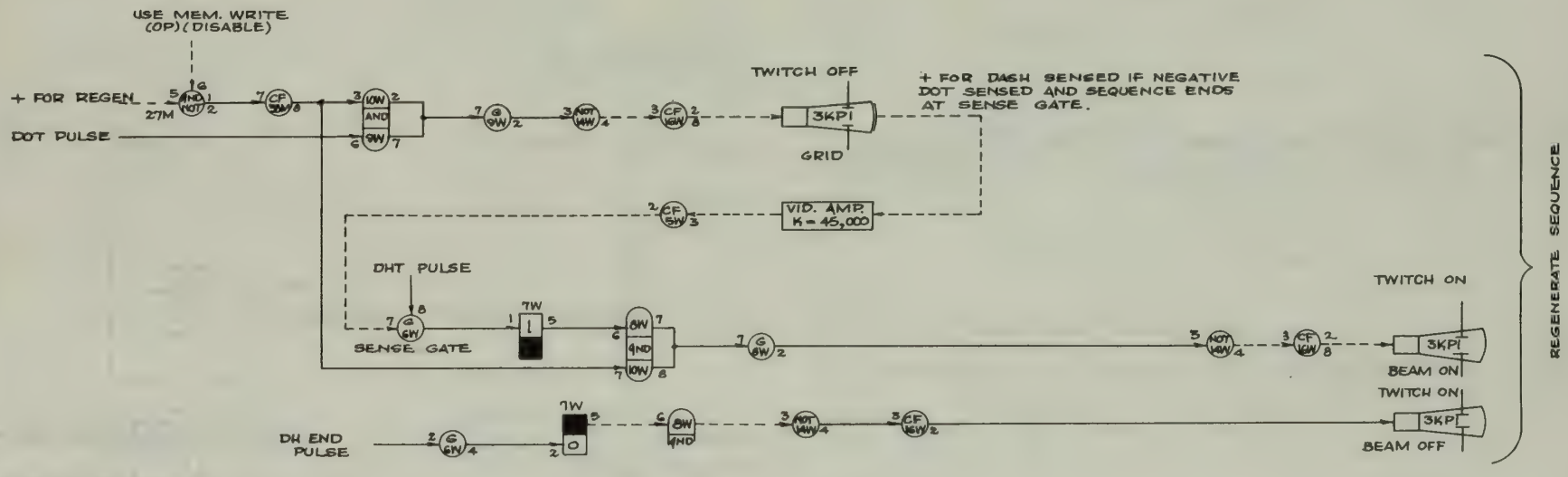
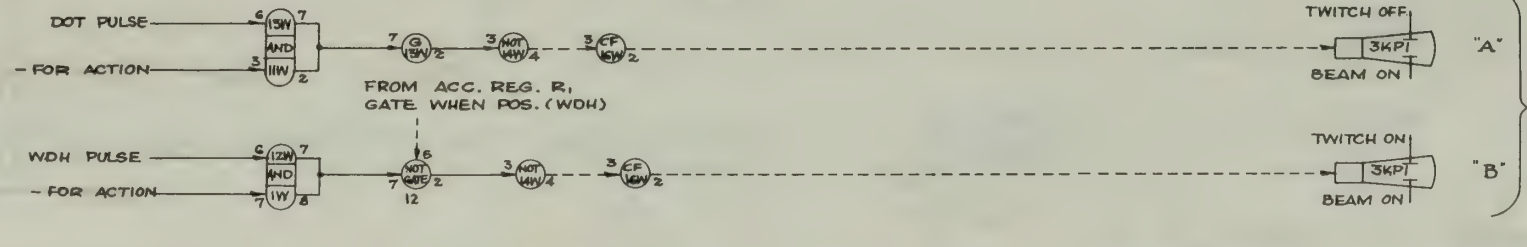
FOR JER BY HMW CHECKED J. E. Robertson APPROVED R. E. Meagher. DATE 9-28-51

TITLE ~ LOGICAL DIAGRAM ~ ARITHMETIC STOP & START CONTROL

M-348







——— NEGATIVE SIGNAL.
- - - - - - - - POSITIVE SIGNAL.

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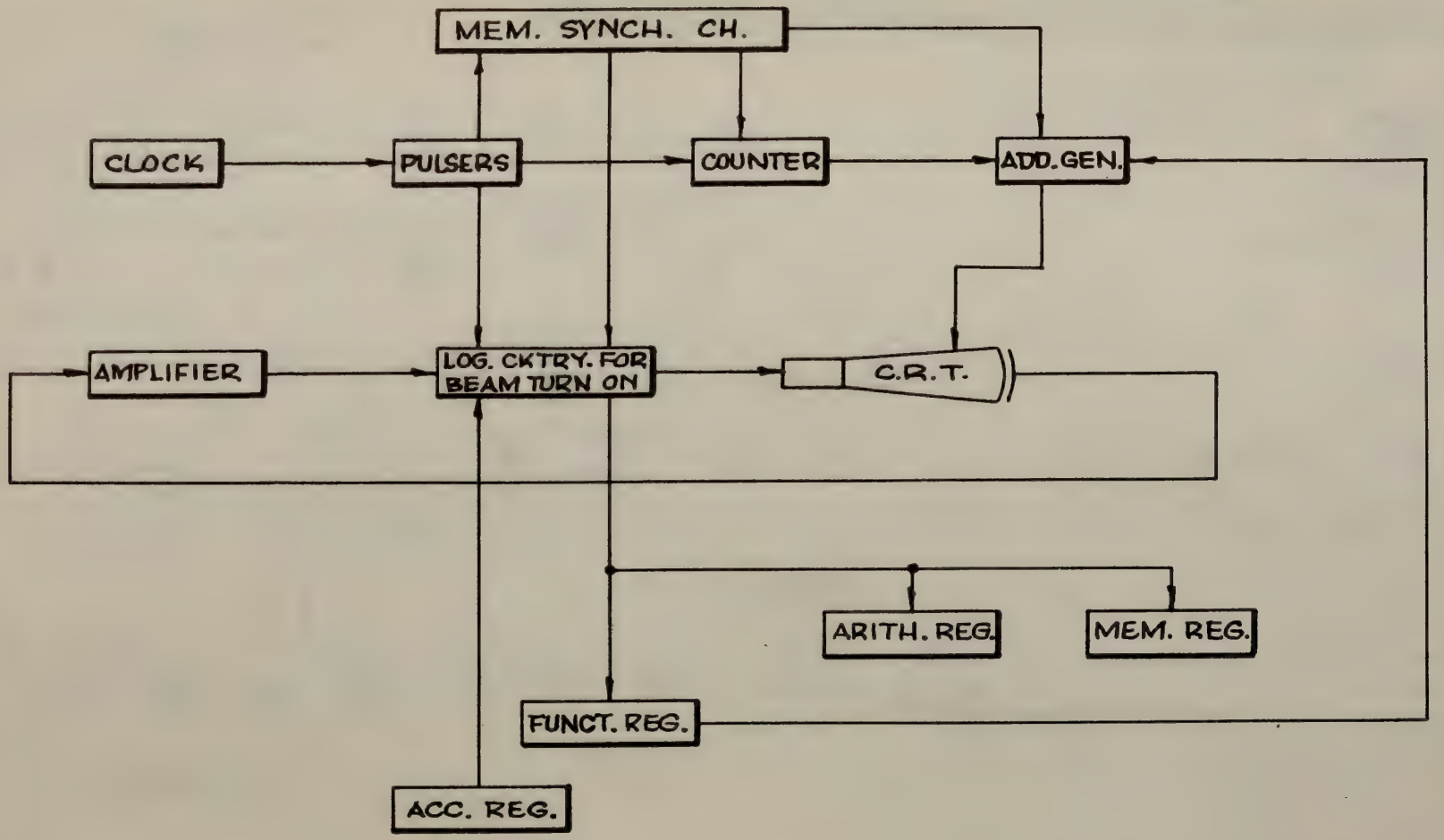
FOR PMK BY WALKER CHECKED OMIC APPROVED R. E. Meagher. DATE 10-1-51

TITLE MEMORY SEQUENCES

M-349



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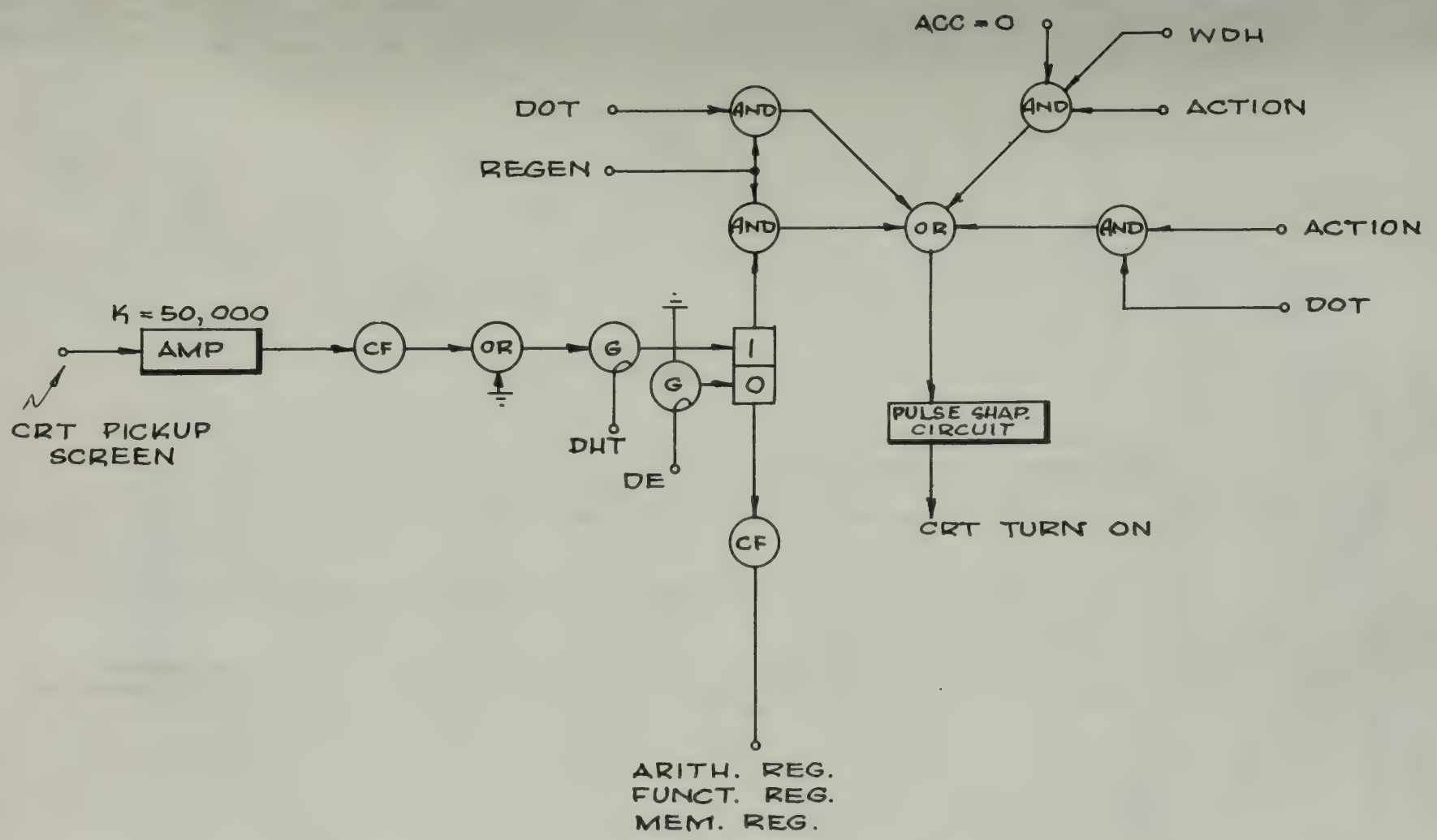
FOR JMW BY HMW CHECKED J.M.W APPROVED R.E. Meagher DATE 10·1·51 S·350

TITLE – MEMORY BLOCK DIAGRAM



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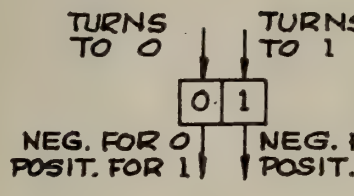
FOR JMW BY HMW CHECKED JMW APPROVED R. E. Meagher DATE 10·1·51

TITLE ~ MEMORY REGEN LOGIC

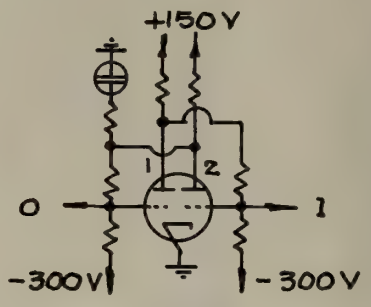
S·351

LOGICAL SYMBOL — CIRCUIT ELEMENT

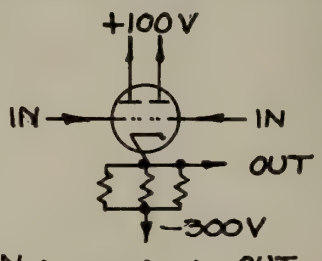
(ENABLING SIGNALS ARE NEGATIVE)

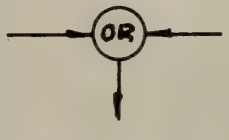


(1) FLIPFLOP

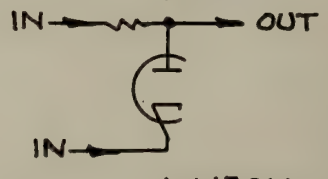


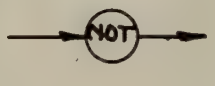
(2) AND CIRCUIT



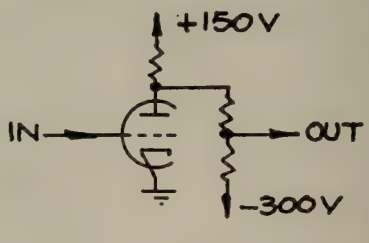


(3) OR CIRCUIT

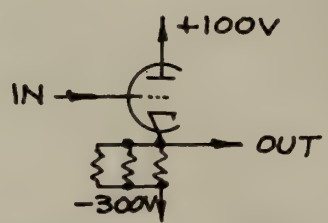




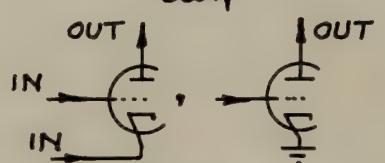
(4) NOT CIRCUIT (INVERTER)



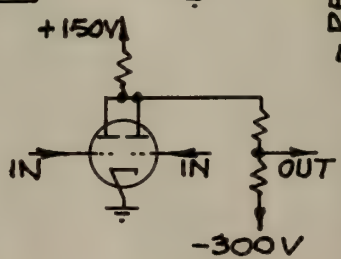
(5) CATHODE FOLLOWER



(6) GATE



(7) AND-NOT CIRCUIT



~ REVISED 10.9.51 ~

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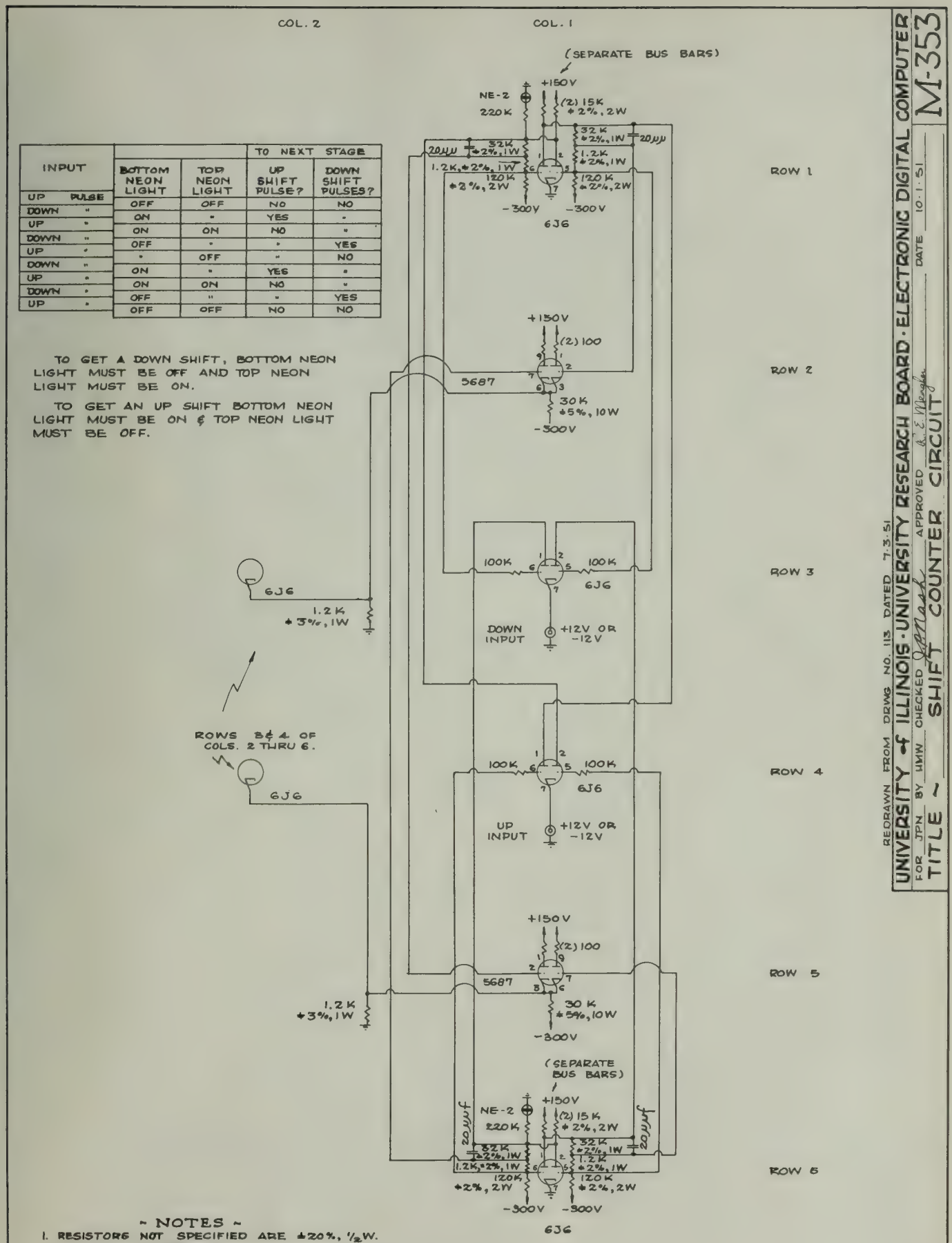
FOR JPN BY HMW CHECKED J. Remark APPROVED R.E. Meagher DATE 10·2·51 S·352

TITLE ~ LOGICAL SYMBOLS & USUAL CIRCUIT EQUIVALENTS



INPUT	TO NEXT STAGE			
	BOTTOM NEON LIGHT	TOP NEON LIGHT	UP SHIFT PULSE?	DOWN SHIFT PULSES?
UP PULSE	OFF	OFF	NO	NO
DOWN "	ON	"	YES	"
UP "	ON	ON	NO	"
DOWN "	OFF	"	"	YES
UP "	"	OFF	"	NO
DOWN "	ON	"	YES	"
UP "	ON	ON	NO	"
DOWN "	OFF	"	"	YES
UP "	OFF	OFF	NO	NO

TO GET A DOWN SHIFT, BOTTOM NEON LIGHT MUST BE OFF AND TOP NEON LIGHT MUST BE ON.

TO GET AN UP SHIFT BOTTOM NEON LIGHT MUST BE ON & TOP NEON LIGHT MUST BE OFF.

~ NOTES ~

1. RESISTORS NOT SPECIFIED ARE ±20%, 1/2W.
2. ALL FILS. AT GROUND.
3. ALL SIX COLS. ARE IDENTICAL.
4. BOTTOM ROW OF COUNTER IS SENSED ROW.
5. DOWN PULSE IS FIRST PULSE OF PAIR.

REDRAWN FROM DRWG NO. 113 DATED 7-3-51

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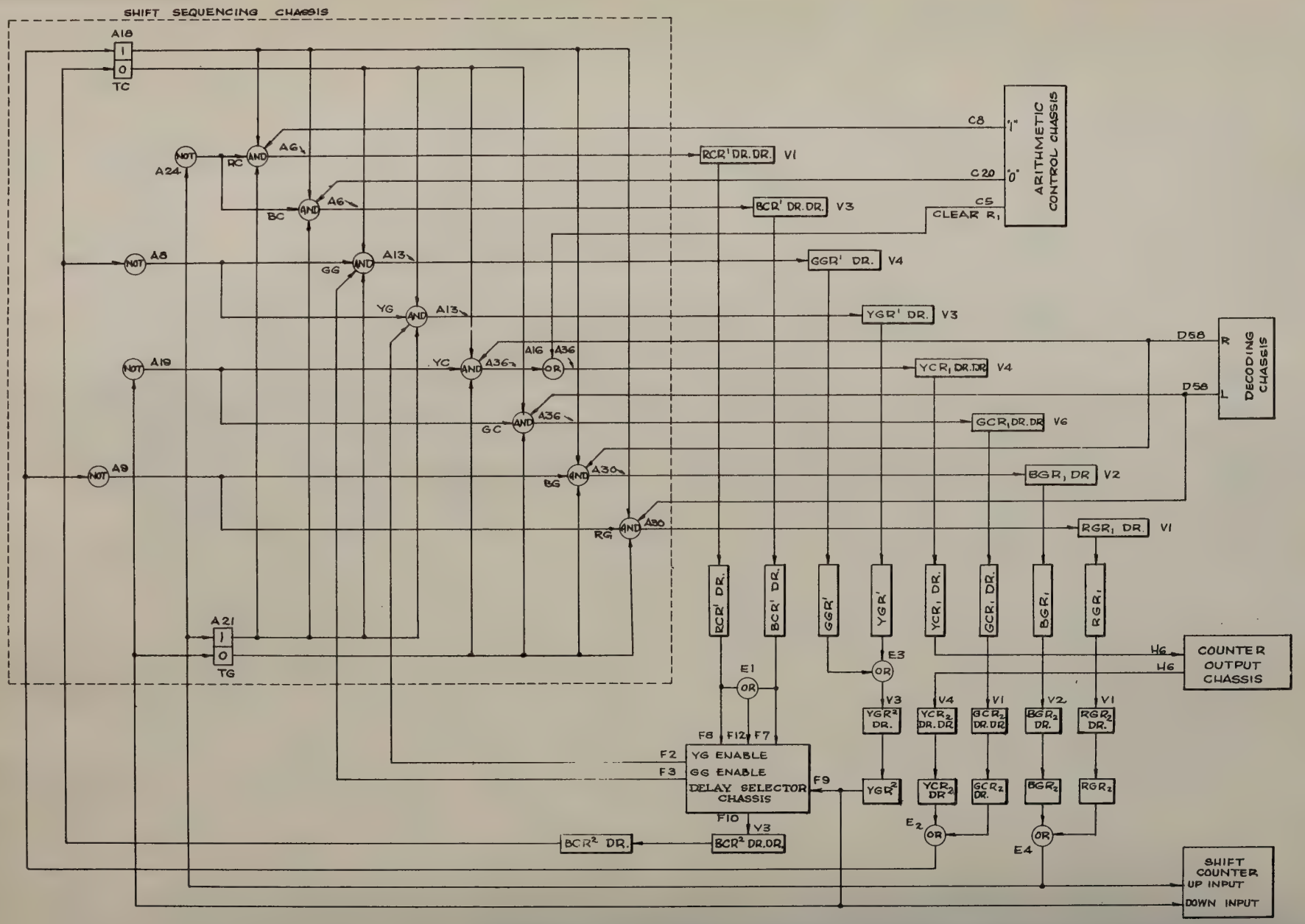
FOR JPN BY HWW CHECKED [signature] APPROVED R. E. Meagher DATE 10-1-51

TITLE ~ SHIFT COUNTER CIRCUIT

M-353



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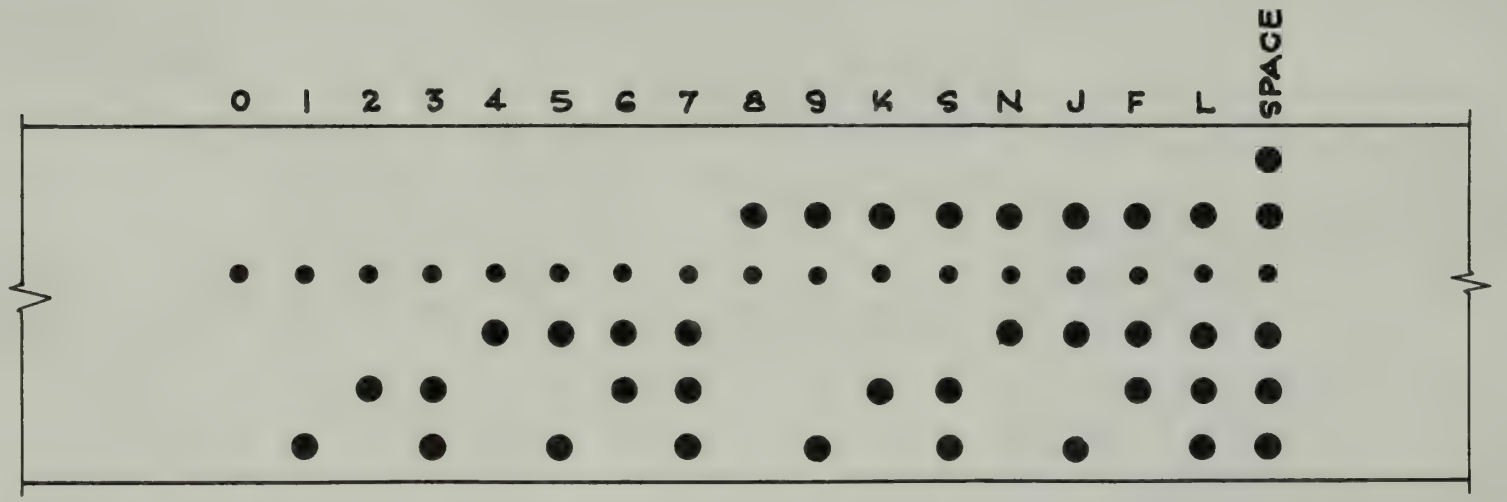
FOR JPN BY HMW CHECKED J.P.Nash APPROVED R.E.Meagher. DATE 10-4-51

TITLE ~ SHIFT CONTROL LOGIC

M-354



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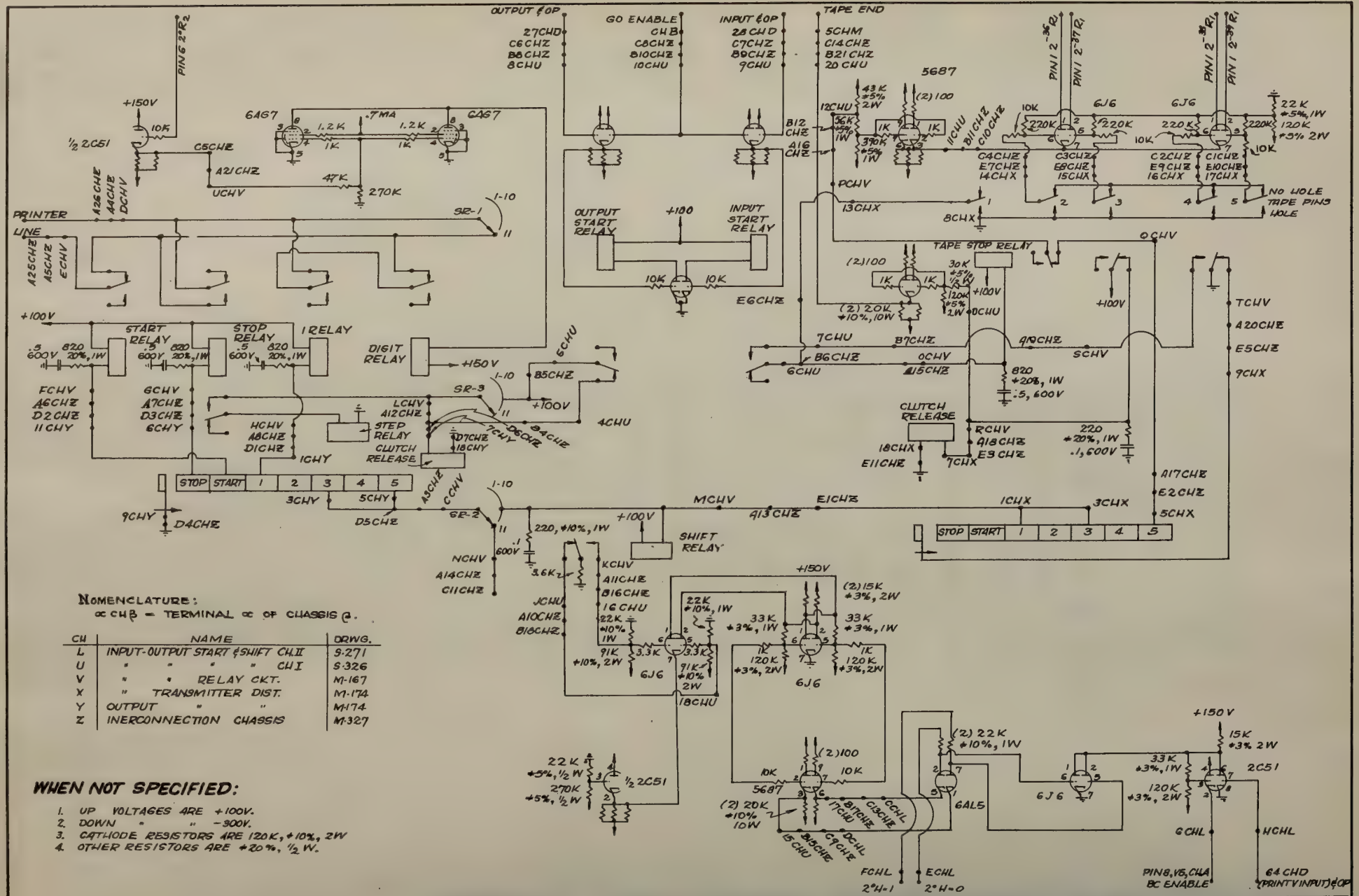
FOR TS BY HMW CHECKED T. SHAPIN APPROVED R. E. Meagher DATE 10·8·51

TITLE ~. PUNCHED TAPE SHOWING CODE USED

S-355



NOMENCLATURE:
∝ CH β = TERMINAL ∝ OF CHASSIS β.

CH	NAME	DRWG.
L	INPUT-OUTPUT START & SHIFT CH. II	S-271
U	" " " " CH. I	S-326
V	" " RELAY CKT.	M-167
X	" TRANSMITTER DIST.	M-174
Y	OUTPUT " "	M-174
Z	INTERCONNECTION CHASSIS	M-327

WHEN NOT SPECIFIED:

1. UP VOLTAGES ARE +100V.
2. DOWN " " -300V.
3. CATHODE RESISTORS ARE 120K, ±10%, 2W
4. OTHER RESISTORS ARE ±20%, ½ W.

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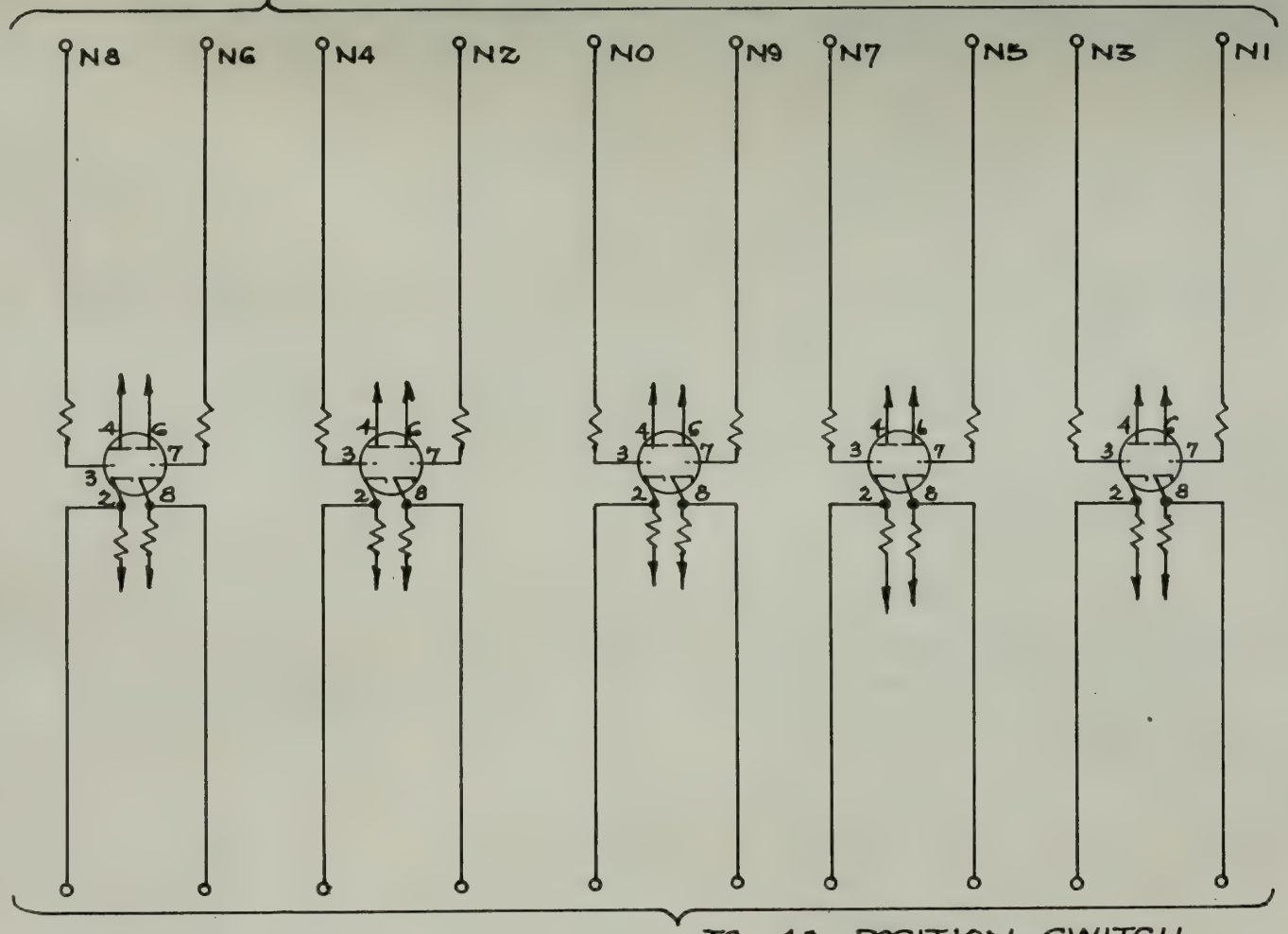
FOR 7S BY HMV CHECKED T. SHAPIN APPROVED R. E. Meagher. DATE 10-10-51

TITLE ~ LOW SPEED INPUT-OUTPUT WIRING

M-356

FROM PIN 8, V16, DRWG. # 196

WHERE N=0, 1, 2, 3 POSIT. NUMBER DECADES.



TO 40 POSITION SWITCH
TO SLAVE TUBE.

- ALL TUBES ARE 2C51'S.
- PLATE VOLTAGES ARE +150V.
- CATHODE " " -300V.
- " RESISTORS • 120K, ±10%, 2W.
- GRID RESISTORS ARE 1.8K, ±20%, ½W.
- FILS AT +50V.

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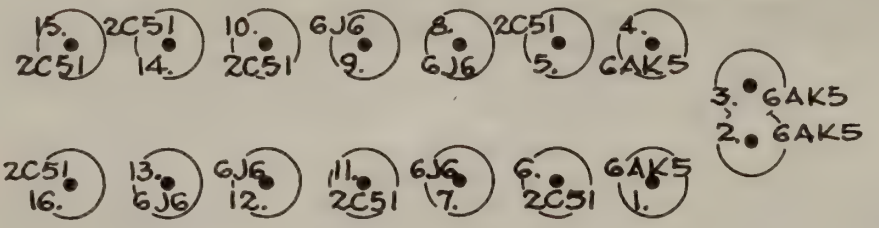
FOR JMW BY HMW CHECKED G.M.M. APPROVED R.E. Meagher. DATE 10·15·51 S·357

TITLE ~ SLAVE TUBE CATHODE FOLLOWERS



BASE DIAGRAM OF VIDEO AMPLIFIER & WILLIAMS TUBE CONTROL.

FRONT PINS OF VIDEO AMPLIFIER & WILLIAMS TUBE CONTROL:

- o TEST 1
- o TEST 2
- o MEM. REG.
- o ACC. REG.
- o NO CONN.

PLUG PIN DIAGRAM FROM REAR OF MACHINE:

oK FIL.	oE FIL.	
oL -300V	oF REGEN	oA GRID OF SLAVE CF
oM WHITE	oG ACT	oB DOT
oN +150V	oH WDH	oC 3KP/GRID
oO +300V	oI DHT	oD DE
oP GND	oJ GND	

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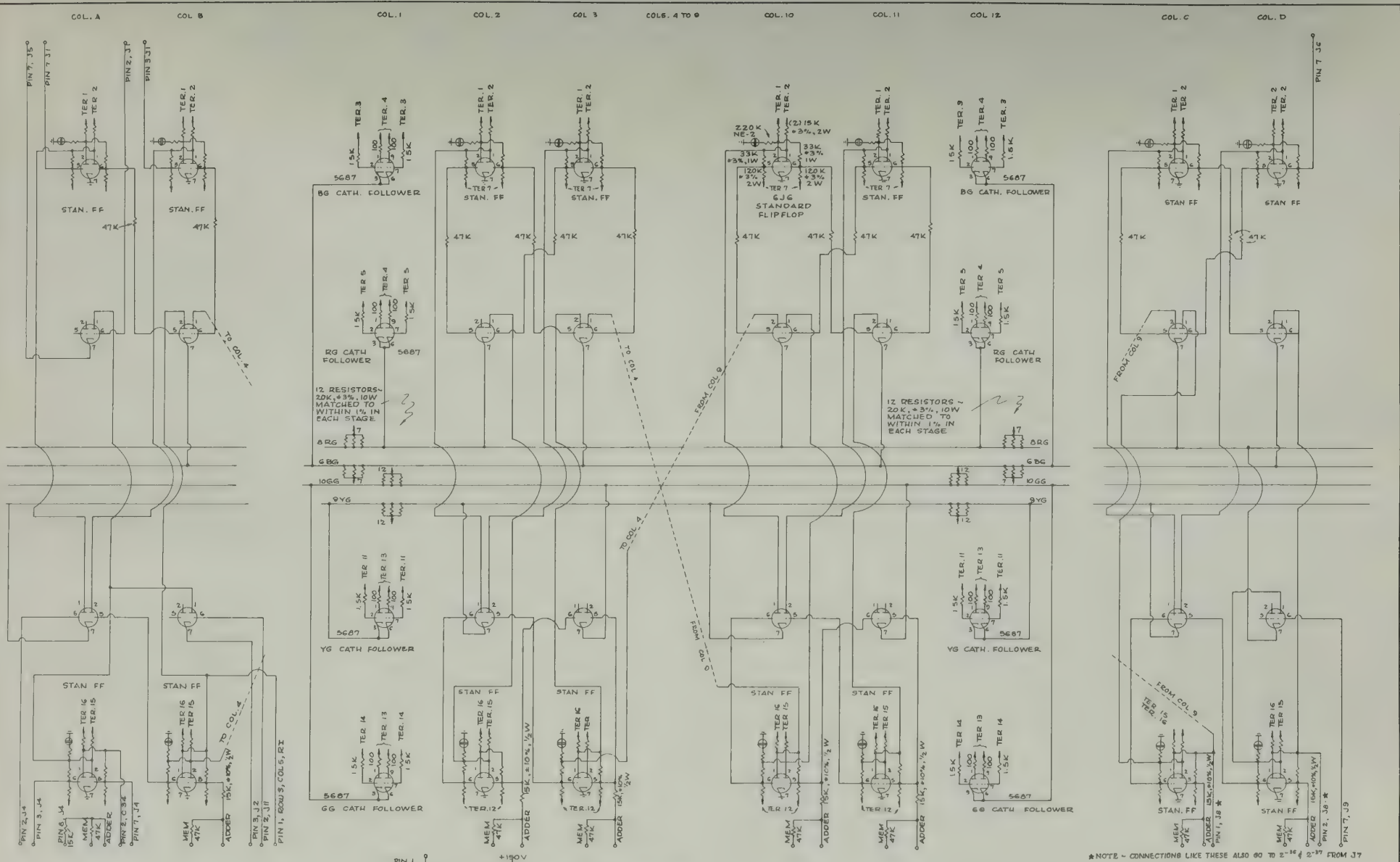
FOR JMW BY HMW CHECKED CMW APPROVED R. E. Meagher. DATE 10·16·51 S·358

TITLE ~ PHYSICAL LAYOUT MEMORY CHASSIS


COL. A
COL B
COL. 1
COL. 2
COL 3
COLS. 4 TO 9
COL. 10
COL. 11
COL 12
COL. C
COL. D
STAN. FF
BG CATH. FOLLOWER
RG CATH FOLLOWER
YG CATH. FOLLOWER
GG CATH FOLLOWER
6J6 STANDARD FLIPFLOP
12 RESISTORS 20K, ±3%, 10W MATCHED TO WITHIN 1% IN EACH STAGE
FROM COL 9
TO COL 4
NOTES:
1 TUBES NOT SPECIFIED ARE 6J6'S.
2. RESISTORS NOT * ARE ±20%, ½W.
3. ALL FILS AT GND.
4. REDRAWN FROM DRWG. NO. 277 DATED 4-16-51.
5. WIRING OF COLS. 4, 6, & 8 IDENTICAL TO THAT OF COL. 2. WIRING OF COLS. 5, 7, & 9 IDENTICAL TO THAT OF COL. 3.
6. COLS. 1 THRU 12 REPRESENT THE STANDARD RI 10 DIGIT REGISTER.
FOR DIGITS 2° TO 2⁻⁹ SUBSTITUTE COLS. A & B FOR COLS. 2 & 3 IN THE STAN. REGISTER.
FOR = 2⁻¹⁰ TO 2⁻¹⁹ & 2⁻²⁰ TO 2⁻²⁹ USE THE STANDARD REGISTER.
FOR = 2⁻³⁰ TO 2⁻³⁹ SUBSTITUTE COLS. C & D FOR COLS. 10 & 11 IN THE STAN REGISTER.
FOR = 2° TO 2⁻⁹ SUBSTITUTE INSERT FOR COLS 5, 7, 9, OF ROW 3 IN STAN. REG.
LEFT ELEVATION
INSERT
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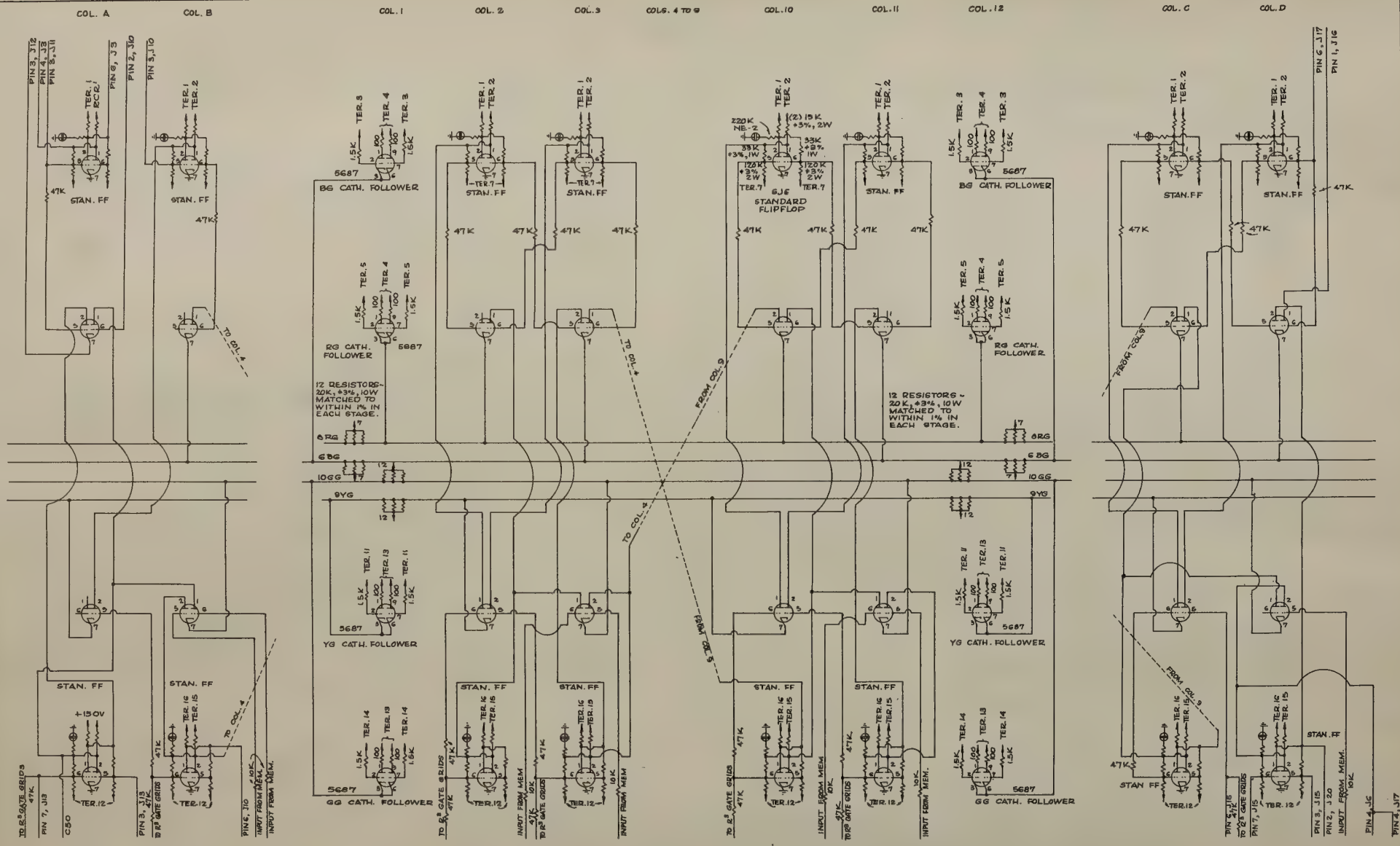
FOR JPN BY HMW CHECKED APPROVED DATE
TITLE ~ RI REGISTER, 2° TO 2⁻⁹, 2⁻¹⁰ TO 2⁻¹⁹ & 2⁻²⁰ TO 2⁻²⁹, 2⁻³⁰ TO 2⁻³⁹
L-359



NOTES:

1. TUBES NOT SPECIFIED ARE 6JE'S.
2. RESISTORS NOT · ARE ±20%, ½W.
3. ALL FILS AT GND.
4. REDRAWN FROM DRWG. NO. 278 DATED 4-18-51.
5. WIRING OF COLS. 4, 6, & 8 IDENTICAL TO COL. 2.
   " " " 3, 7, & 9 " " COL. 3.
6. COLS. 1 THRU 12 REPRESENT THE STANDARD RII 10 DIGIT REGISTER.
   FOR DIGITS 2^{0} TO 2^{-9} SUBSTITUTE COLS. A & B FOR COLS. 2 & 3 IN THE STAN. REGISTER.
   FOR " 2^{-10} TO 2^{-19} & 2^{-20} TO 2^{-29} USE THE STANDARD REGISTER.
   FOR " 2^{-30} TO 2^{-39} SUBSTITUTE COLS. C & D FOR COLS. 10 & 11 IN THE STAN. REGISTER.

REVISED 2-27-52.

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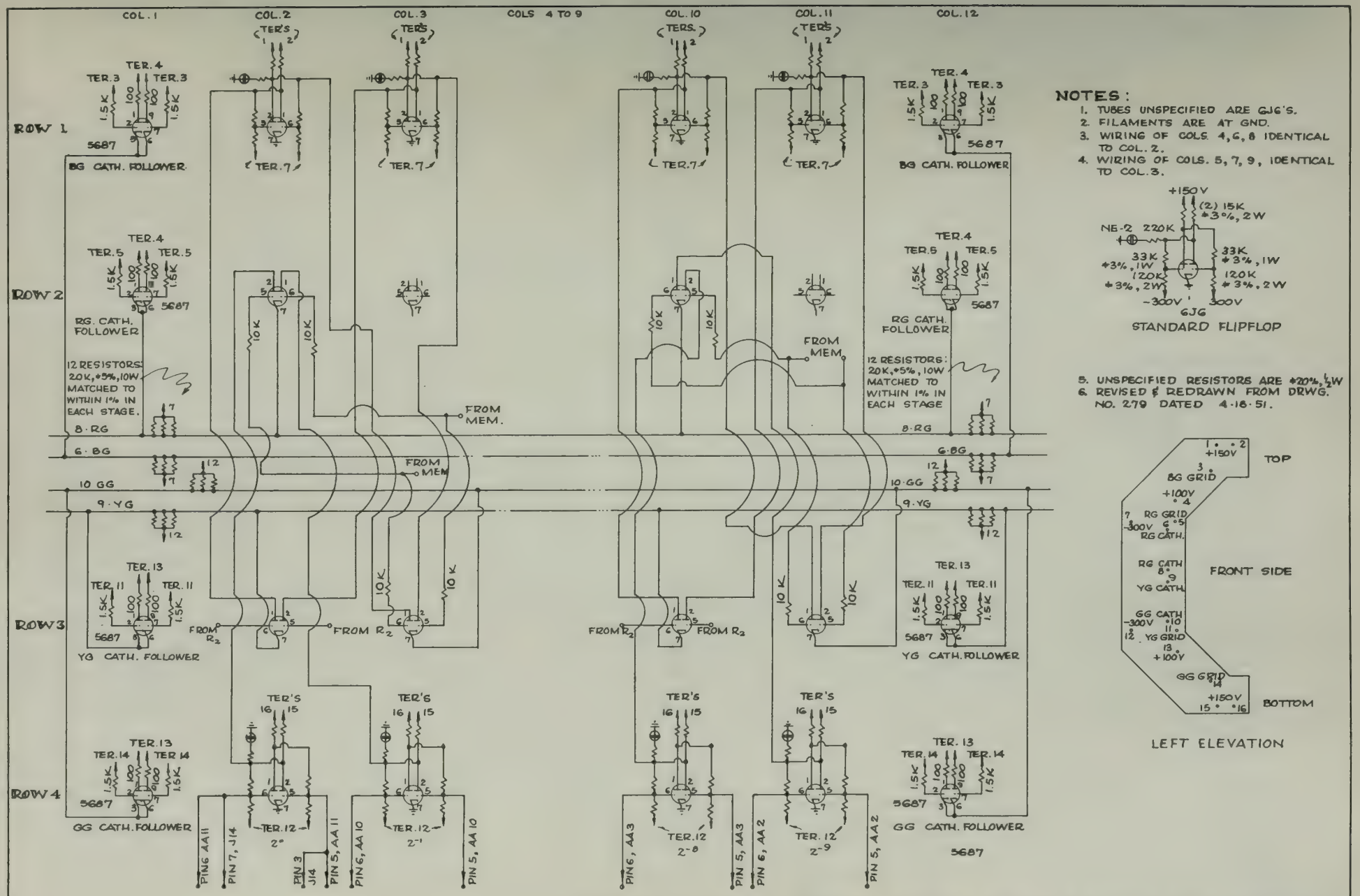
FOR JPN BY HMW CHECKED Jonash APPROVED R. E. Meagher DATE 10-23-51

TITLE ~ RII REGISTER, 2^{0} TO 2^{-9}, 2^{-10} TO 2^{-19} & 2^{-20} TO 2^{-29}, 2^{-30} TO 2^{-39}

L-360



NOTES:

1. TUBES UNSPECIFIED ARE GJG'S.
2. FILAMENTS ARE AT GND.
3. WIRING OF COLS. 4, 6, 8 IDENTICAL TO COL. 2.
4. WIRING OF COLS. 5, 7, 9, IDENTICAL TO COL. 3.

STANDARD FLIPFLOP

5. UNSPECIFIED RESISTORS ARE ±20%, ½W
6. REVISED & REDRAWN FROM DRWG. NO. 279 DATED 4-18-51.

LEFT ELEVATION

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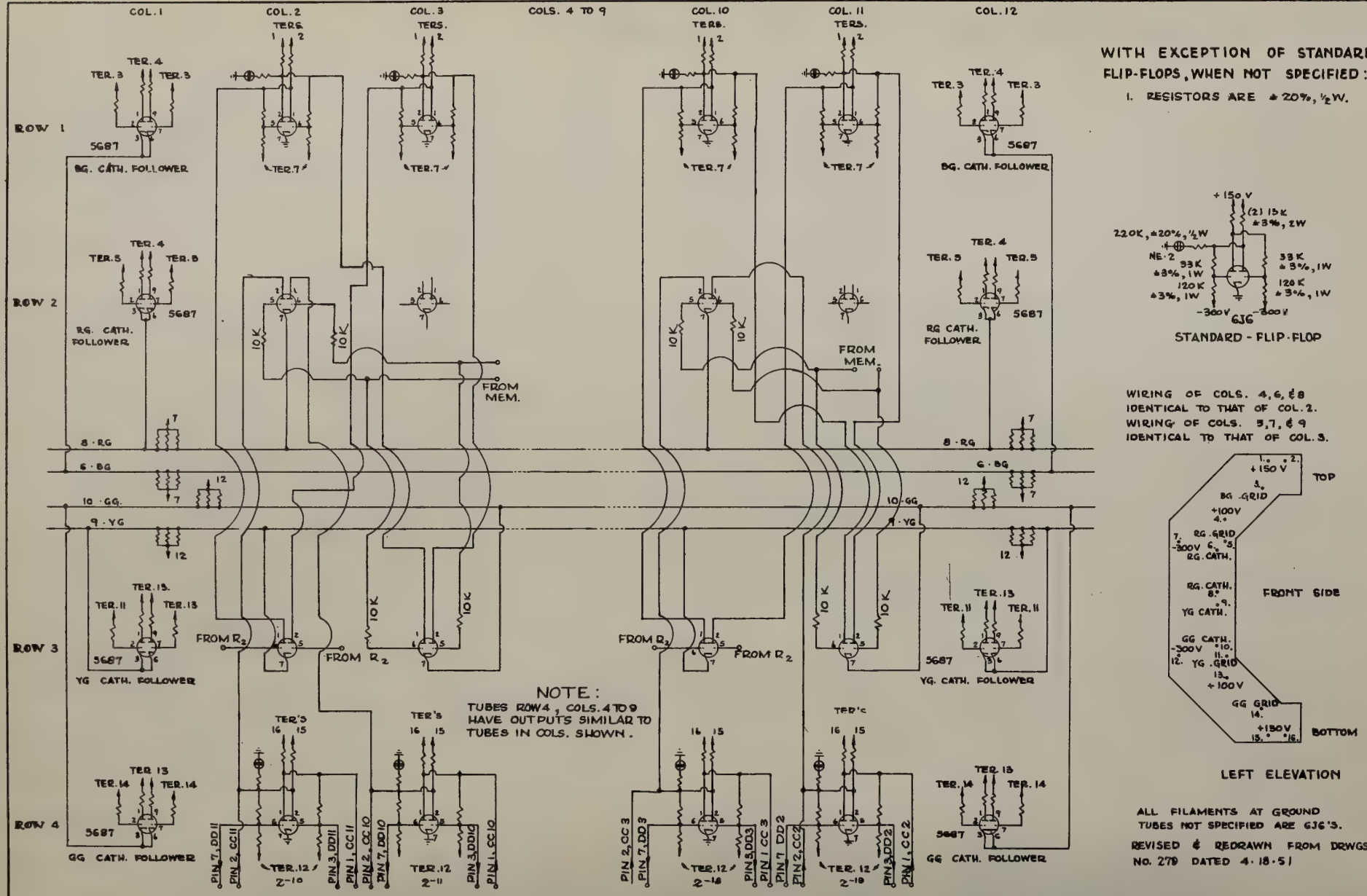
FOR J.P.N.	BY H.M.W.	CHECKED J.P.Nash	APPROVED R.E.Meagher	DATE 10-24-51	M-361
TITLE RIII REGISTER, 2° TO 2⁻⁹					



WITH EXCEPTION OF STANDARD FLIP-FLOPS, WHEN NOT SPECIFIED:

1. RESISTORS ARE ± 20%, ½W.

STANDARD - FLIP-FLOP

WIRING OF COLS. 4, 6, & 8 IDENTICAL TO THAT OF COL. 2.
WIRING OF COLS. 5, 7, & 9 IDENTICAL TO THAT OF COL. 3.

LEFT ELEVATION

ALL FILAMENTS AT GROUND
TUBES NOT SPECIFIED ARE 6J6'S.

REVISED & REDRAWN FROM DRWGS. NO. 279 DATED 4-18-51

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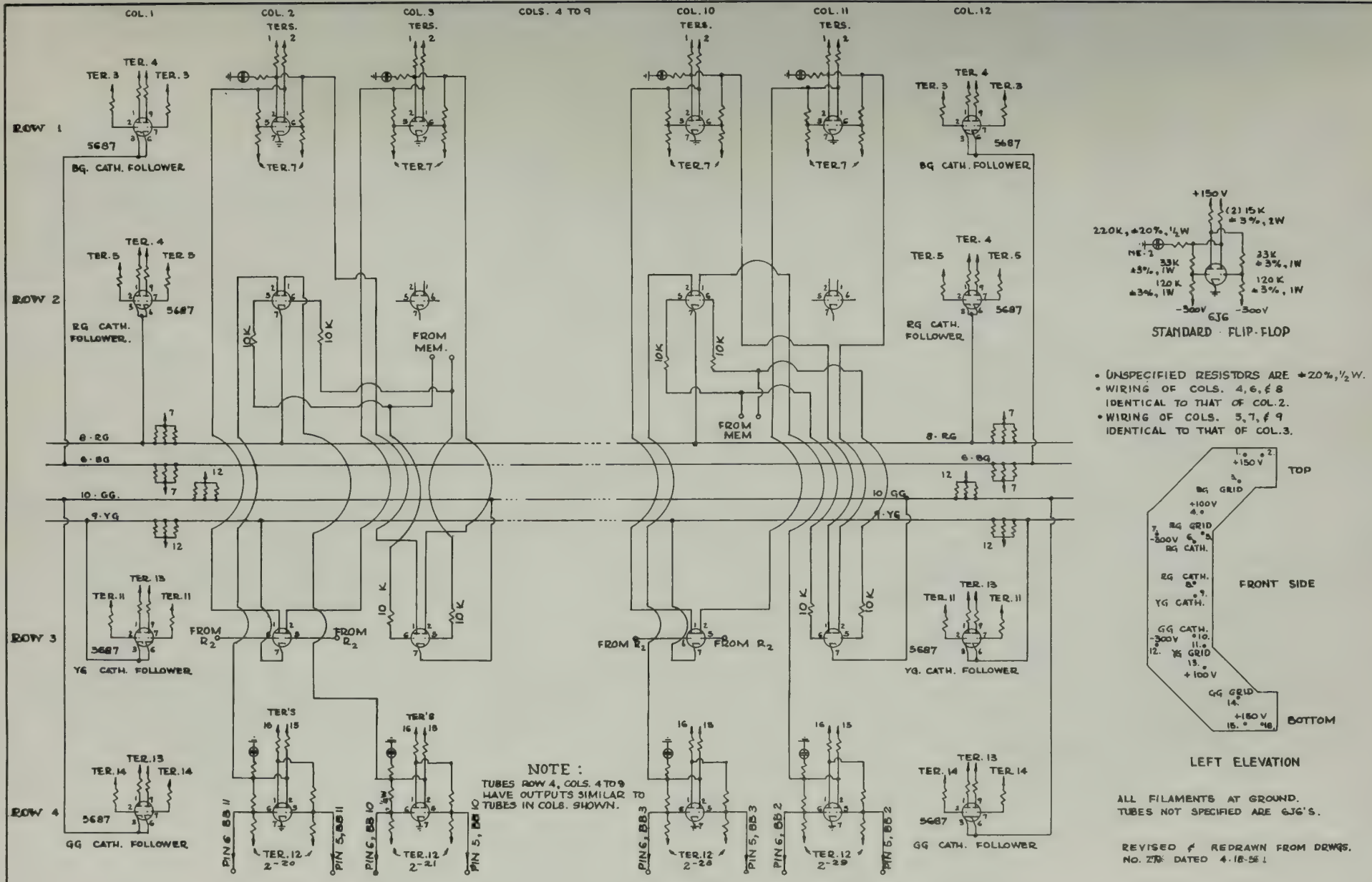
FOR J.P.N. BY H.H.W. CHECKED G.Mash APPROVED R.F. Meagher DATE 10-24-51

TITLE R III REGISTER, 2^{-10} TO 2^{-19}

M-362



STANDARD · FLIP-FLOP

- UNSPECIFIED RESISTORS ARE ±20%, ½W.
- WIRING OF COLS. 4, 6, & 8 IDENTICAL TO THAT OF COL. 2.
- WIRING OF COLS. 5, 7, & 9 IDENTICAL TO THAT OF COL. 3.

LEFT ELEVATION

ALL FILAMENTS AT GROUND.
TUBES NOT SPECIFIED ARE 6JG'S.

REVISED & REDRAWN FROM DRWGS. NO. 270 DATED 4-18-51

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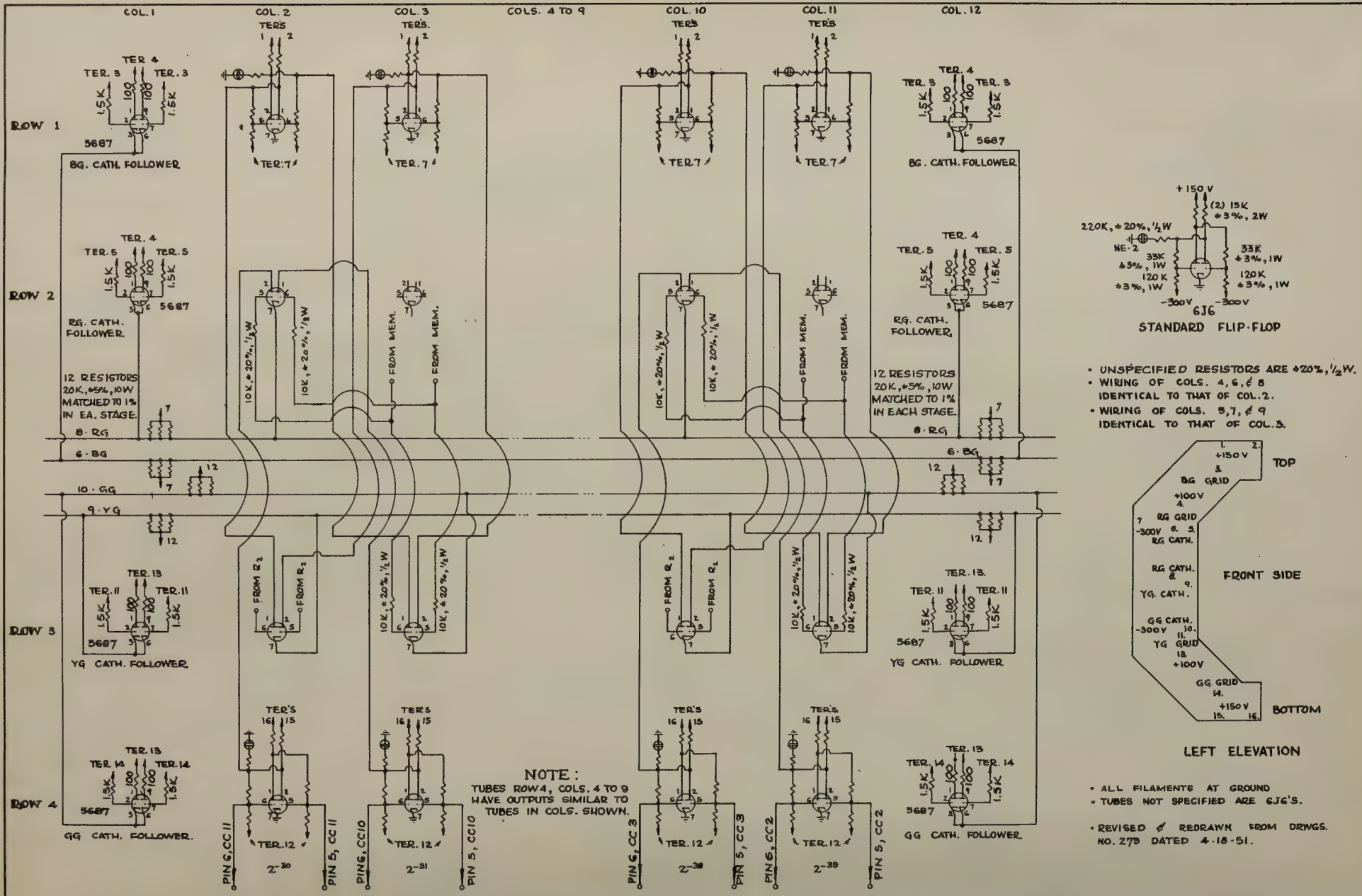
FOR J.P.N BY H.M.W. CHECKED J. Nash APPROVED R. E. Meagher DATE 10:24:51

TITLE R III REGISTER, 2^{-20} TO 2^{-29}

M·363



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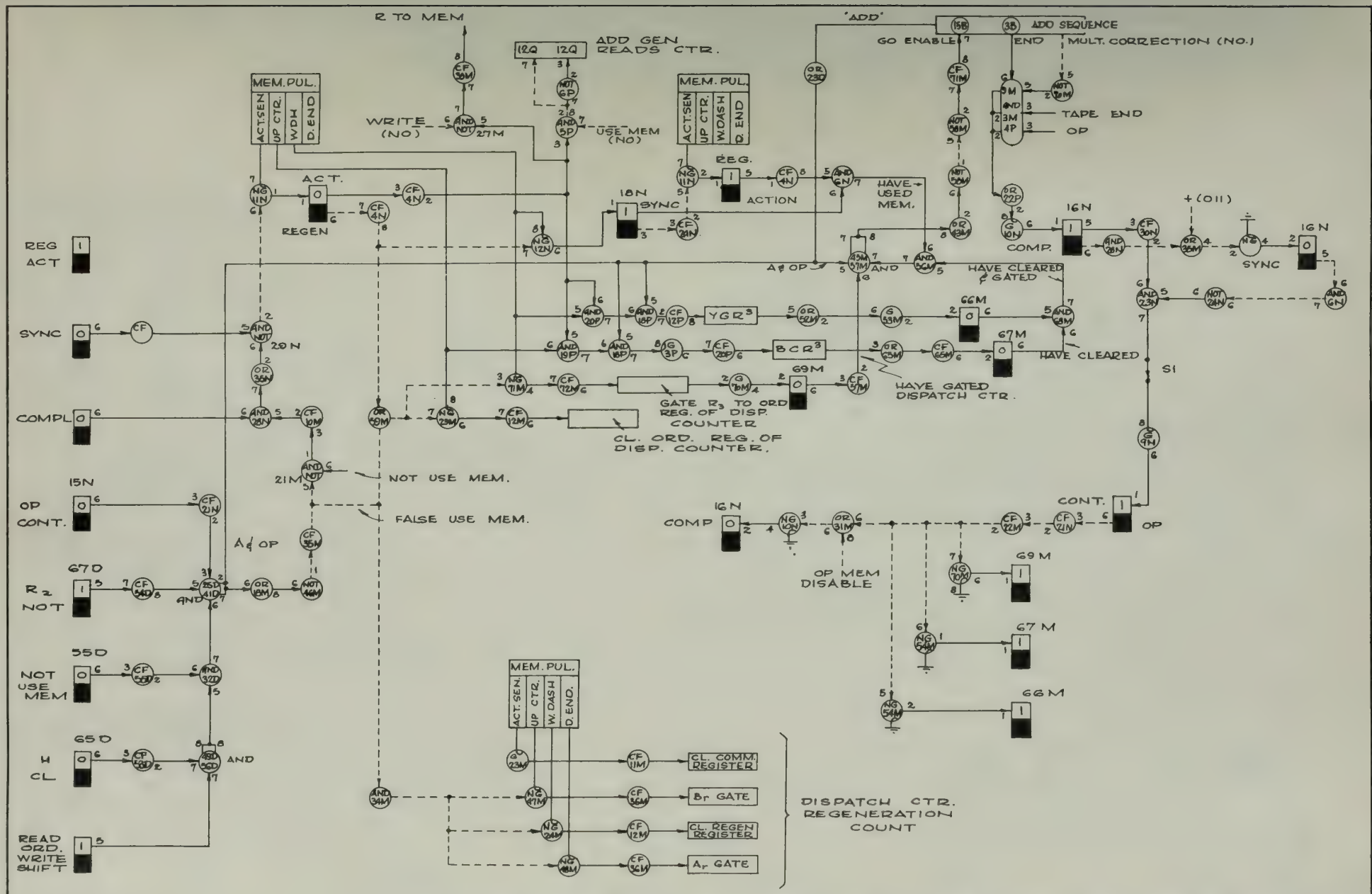
FOR J.P.N. BY H.M.W. CHECKED J.P.Nash APPROVED R.E. Meagher DATE 10.24.51

TITLE RIII REGISTER, 2^{-30} TO 2^{-39}

M·364



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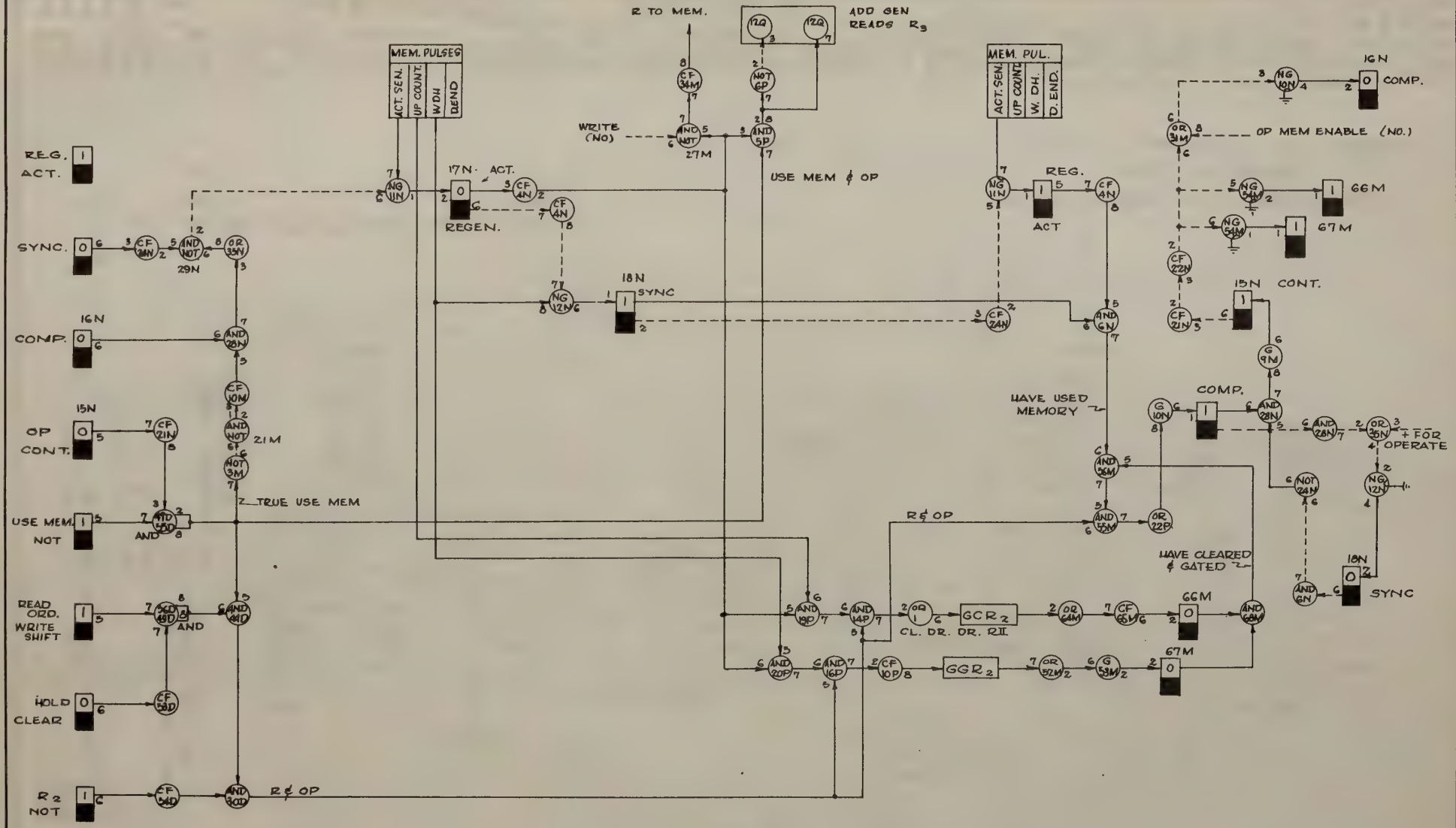
FOR PMK BY HMW CHECKED Dan K APPROVED R E Meagher DATE 10·28·51

TITLE ~ "A" OPERATION SEQUENCE

M-365



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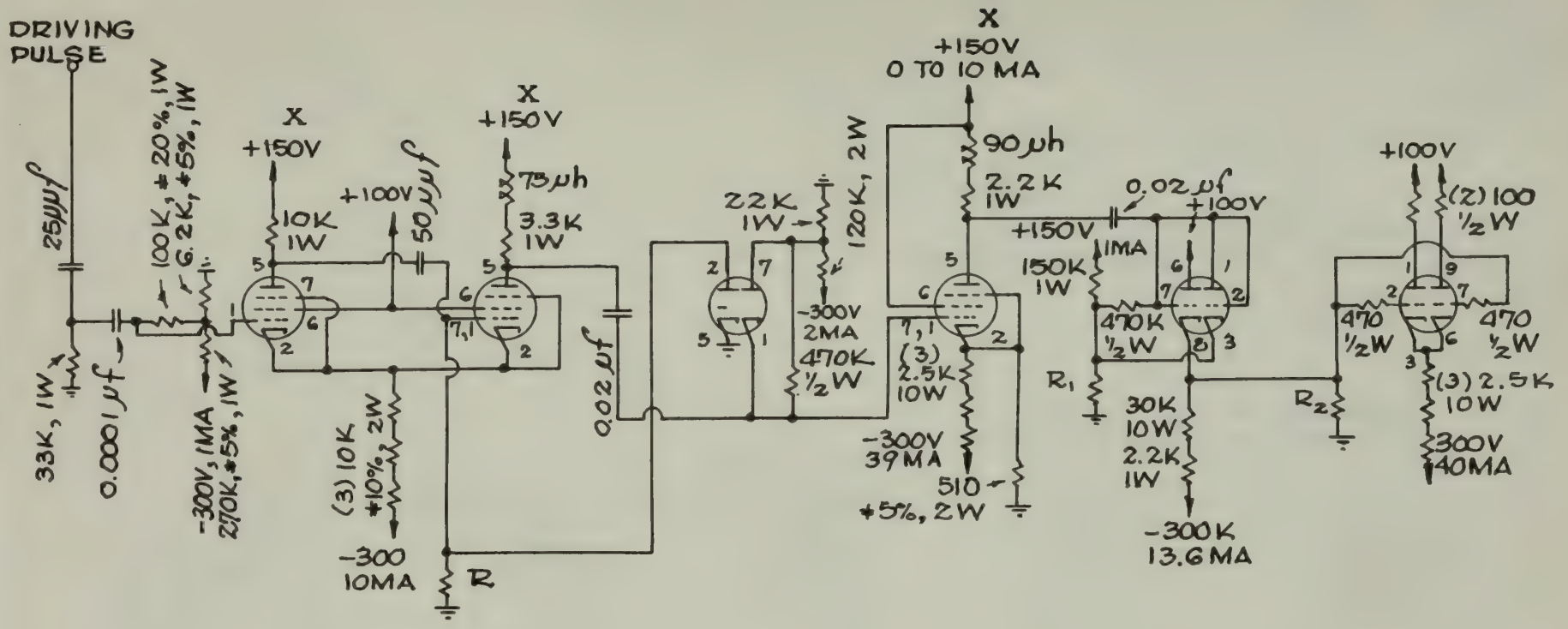
FOR PMK BY HMW CHECKED EMK APPROVED R. E. Meagher DATE 11-4-51

TITLE - "R" OPERATION SEQUENCE

M-366

6AK5 6AK5 6AL5 6AQ5 12AU7 5687



R IS APROXIMATELY 20K
R_1 " " 7.5K
R_2 " " 3K

RESISTORS NOT SPECIFIED ARE ±20%.
ALL FILAMENTS AT GND.

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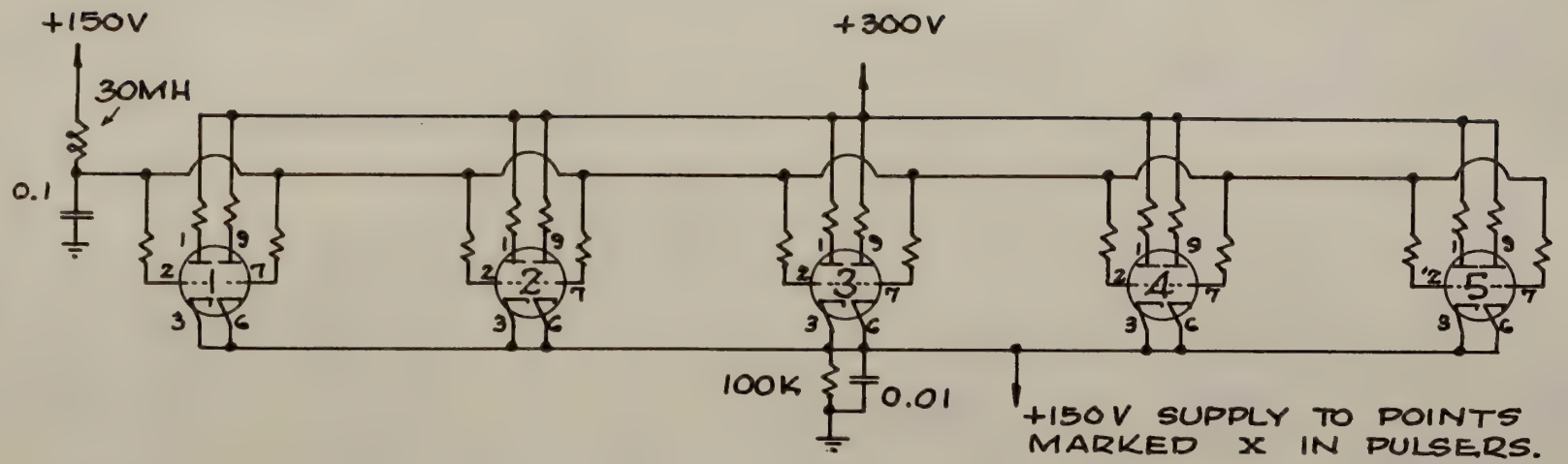
FOR JMW BY HMW CHECKED J. M. W. APPROVED R. E. Meagher DATE 11·12·51 S·368

TITLE ~ MEMORY PULSER



ALL RESISTORS ARE ± 20%, ½W.
" PLATE RESISTORS ARE 100 Ω.
" GRID " " 1K.
" TUBES ARE 5687's.
" FILS. PINNED AT +150V.

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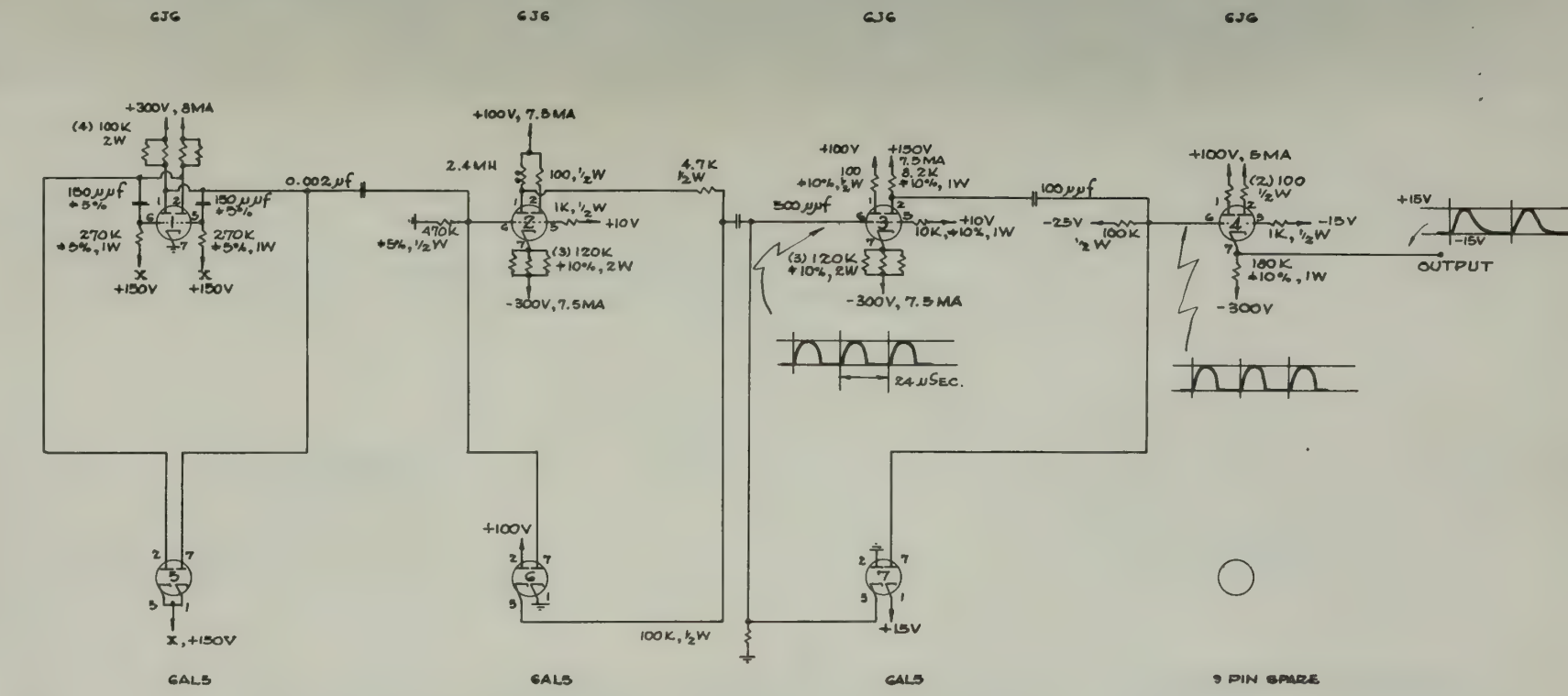
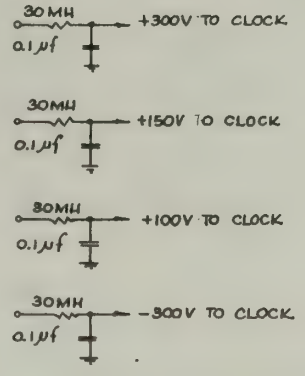
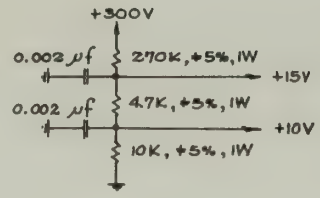
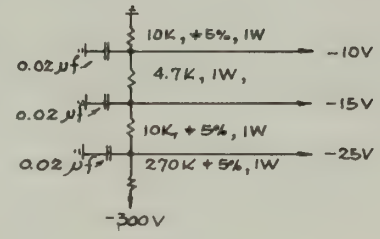
FOR JMW BY HMW CHECKED J.M.W APPROVED R. E. Meagher. DATE 11·13·51

TITLE ~ PULSER SUPPLY CHASSIS S·369









ALL RESISTORS NOT SPECIFIED ARE ±20%.
ALL FILS AT GROUND.

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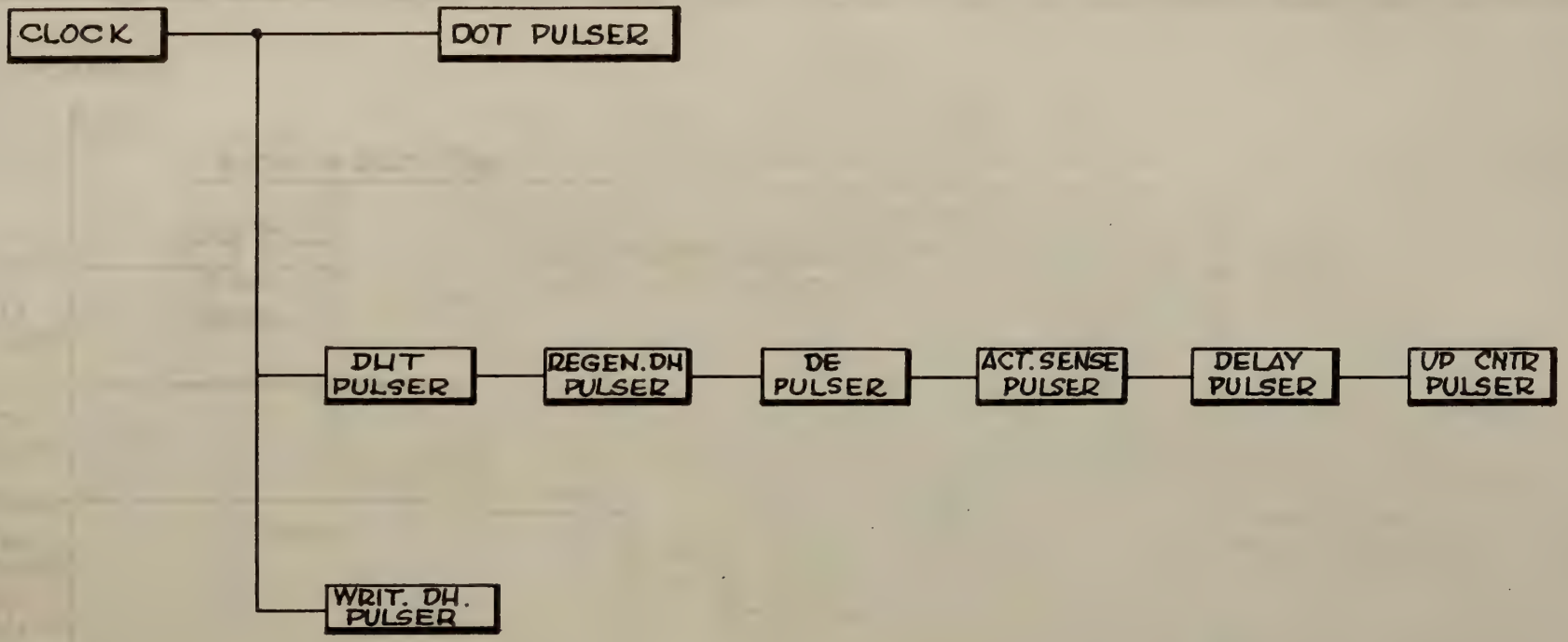
FOR JMW BY HMW CHECKED J. Th. K. APPROVED R. E. Meagher DATE 10·19·51

TITLE ~ W IV CLOCK

M-370



PULSES ARE INITIATED UPON COMPLETION OF THE TRIGGERING PULSE.

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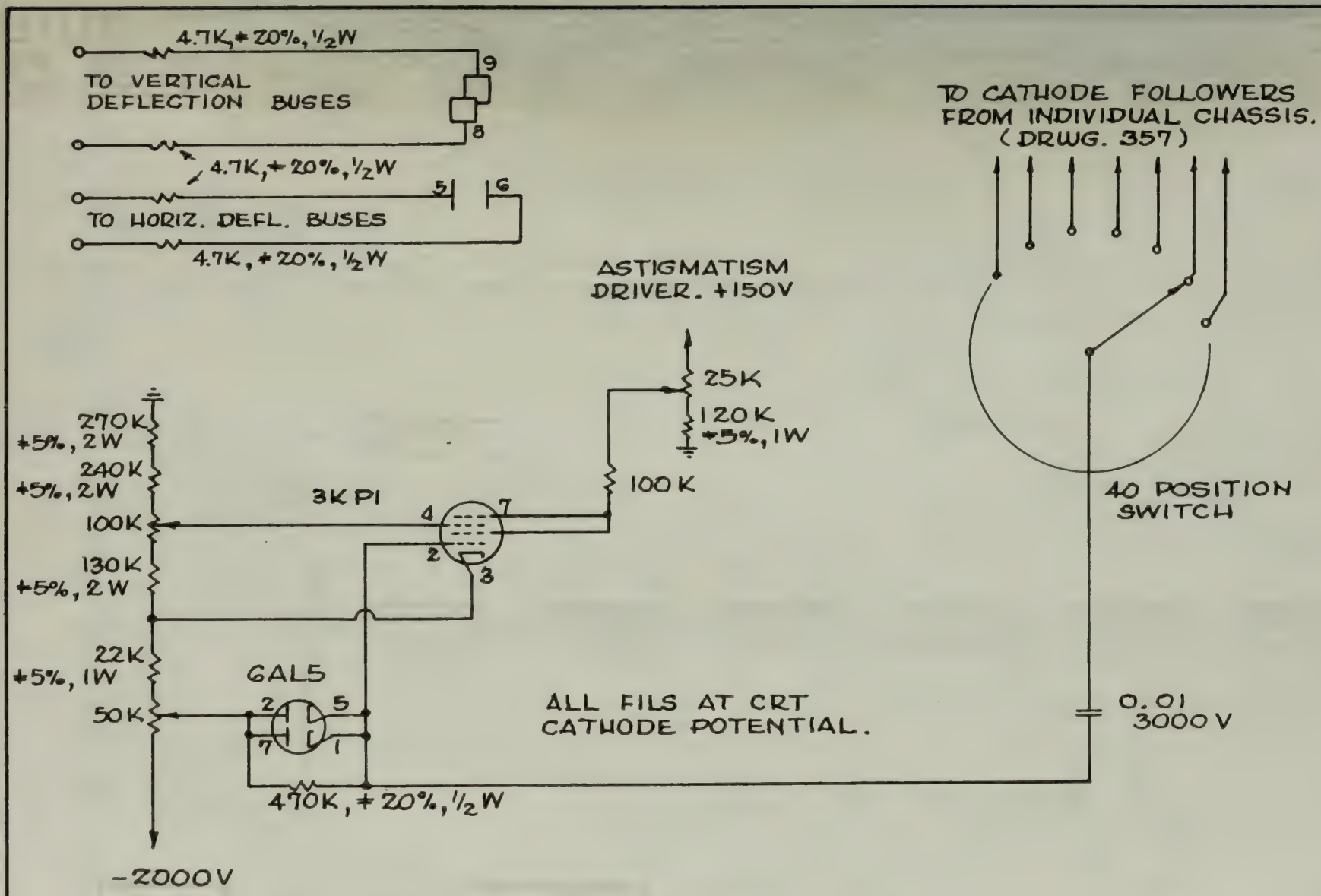
FOR JMW BY HMW CHECKED J. M. W. APPROVED R. E. Meagher DATE 11-19-51

TITLE ~ PULSER CONNECTIONS S-371



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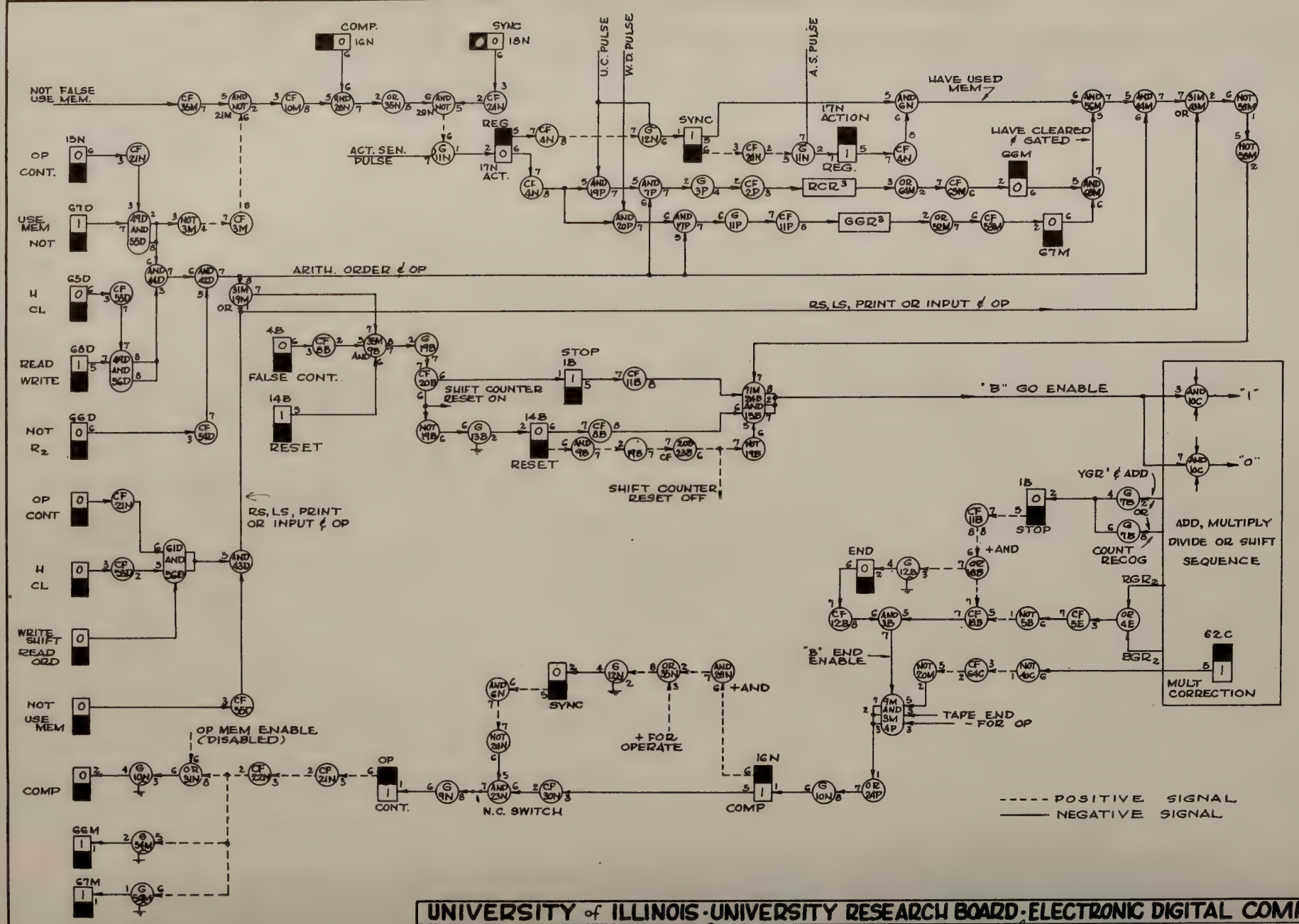
FOR JMW BY HMW CHECKED J.M.W. APPROVED R. E. Meagher DATE 11-29-51

TITLE ~ SLAVE TUBE

S-372



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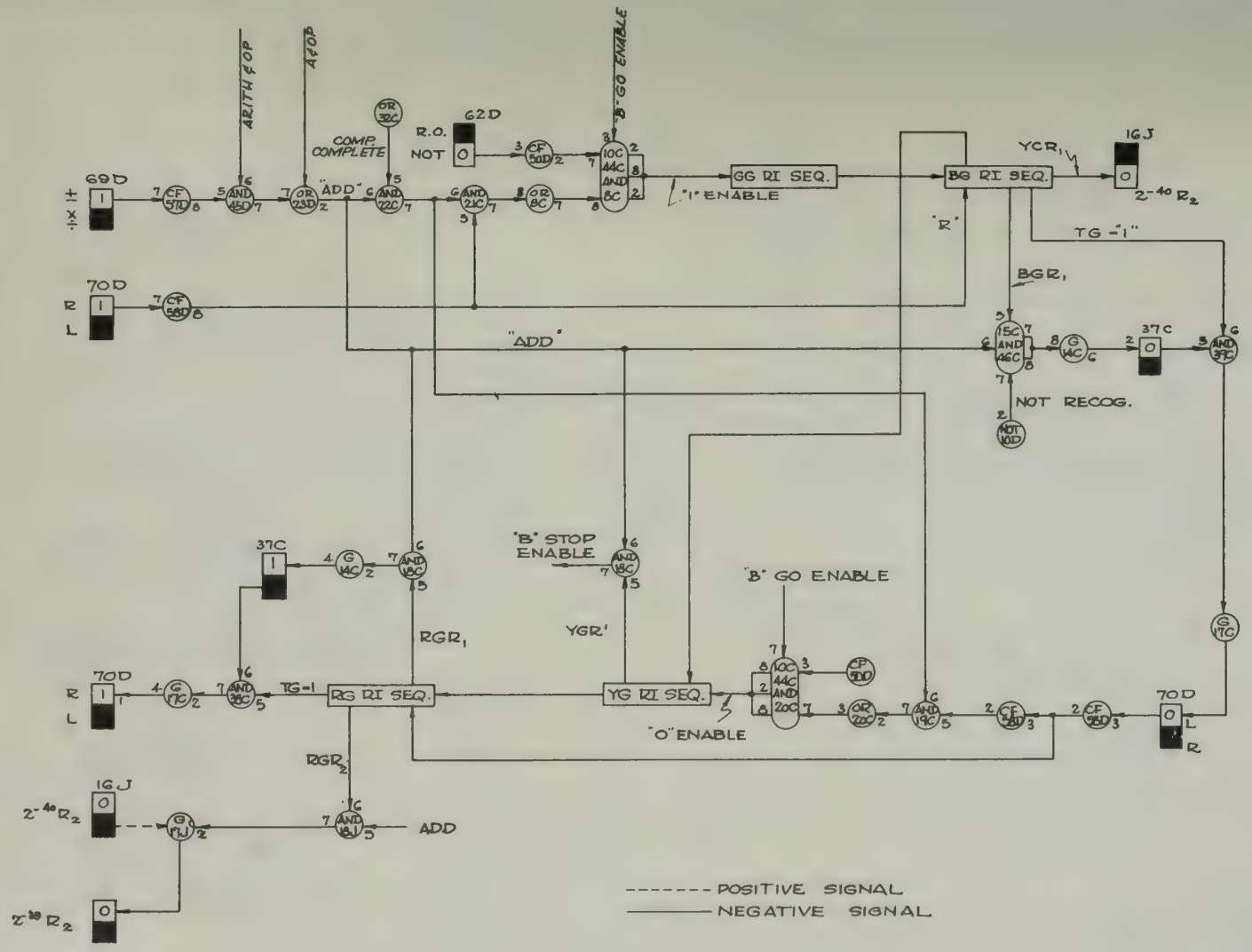
FOR PMK BY HMW CHECKED PMK APPROVED R. E. Meagher DATE 12-18-51

TITLE - ARITHMETIC OR SHIFT OPERATION SEQUENCE

M-374



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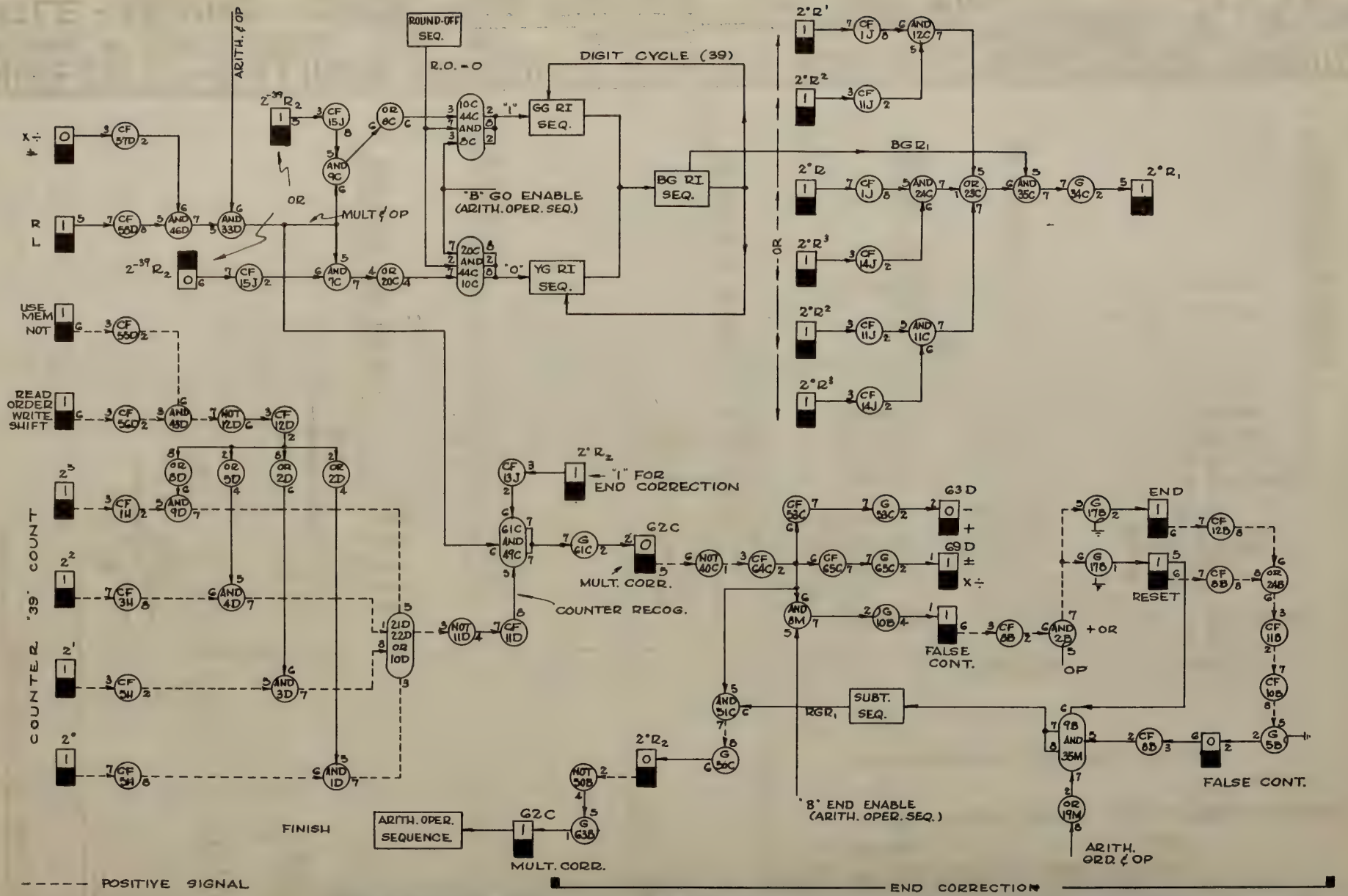
FOR PMK BY HMW CHECKED Orvic APPROVED R. E. Meagher DATE 1-2-52

TITLE ~ ADD OPERATION SEQUENCE

M-375



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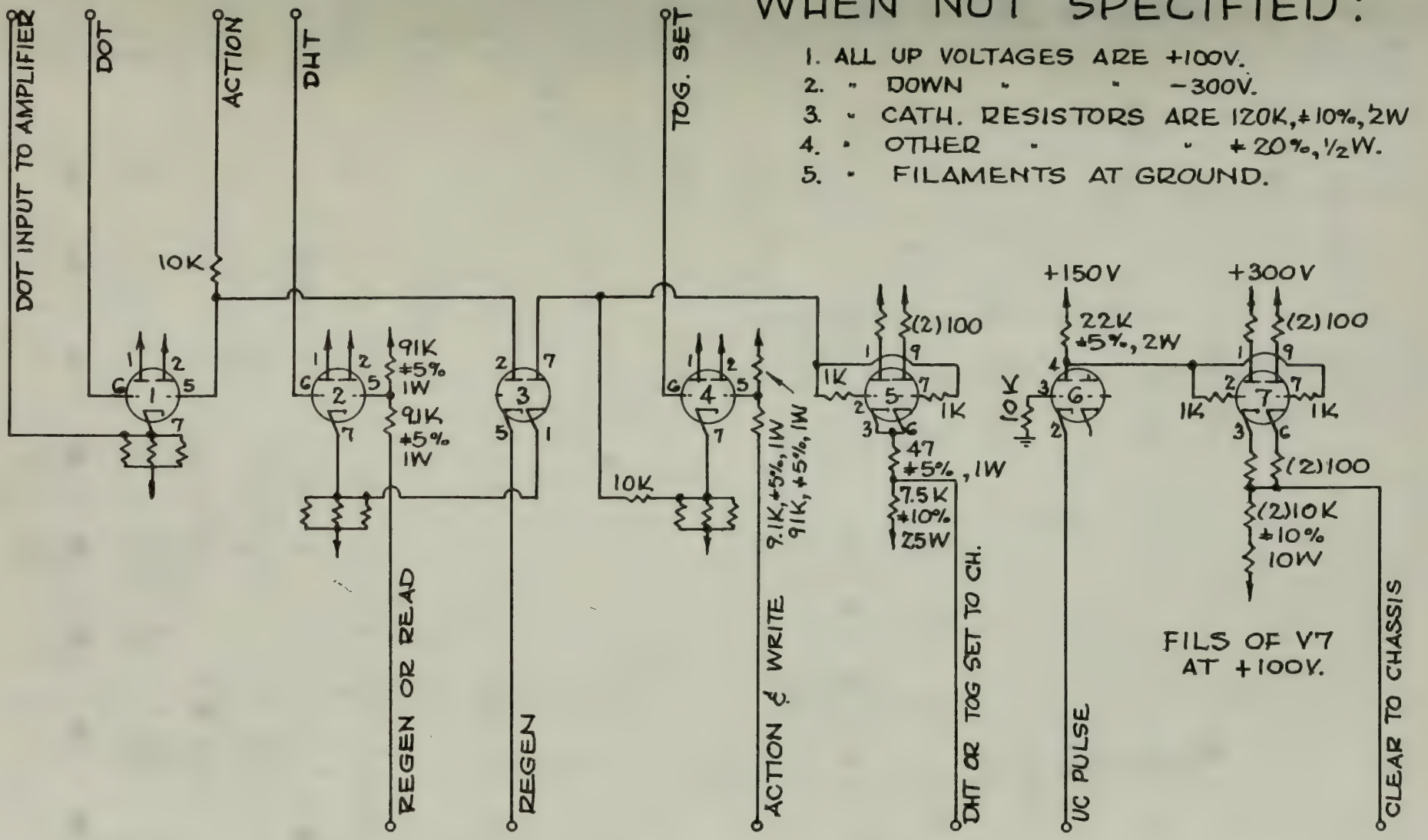
FOR PMK BY HMW CHECKED GMK APPROVED R. E. Meagher DATE 1-16-52

TITLE ~ MULTIPLICATION OPERATION SEQUENCE

M-376



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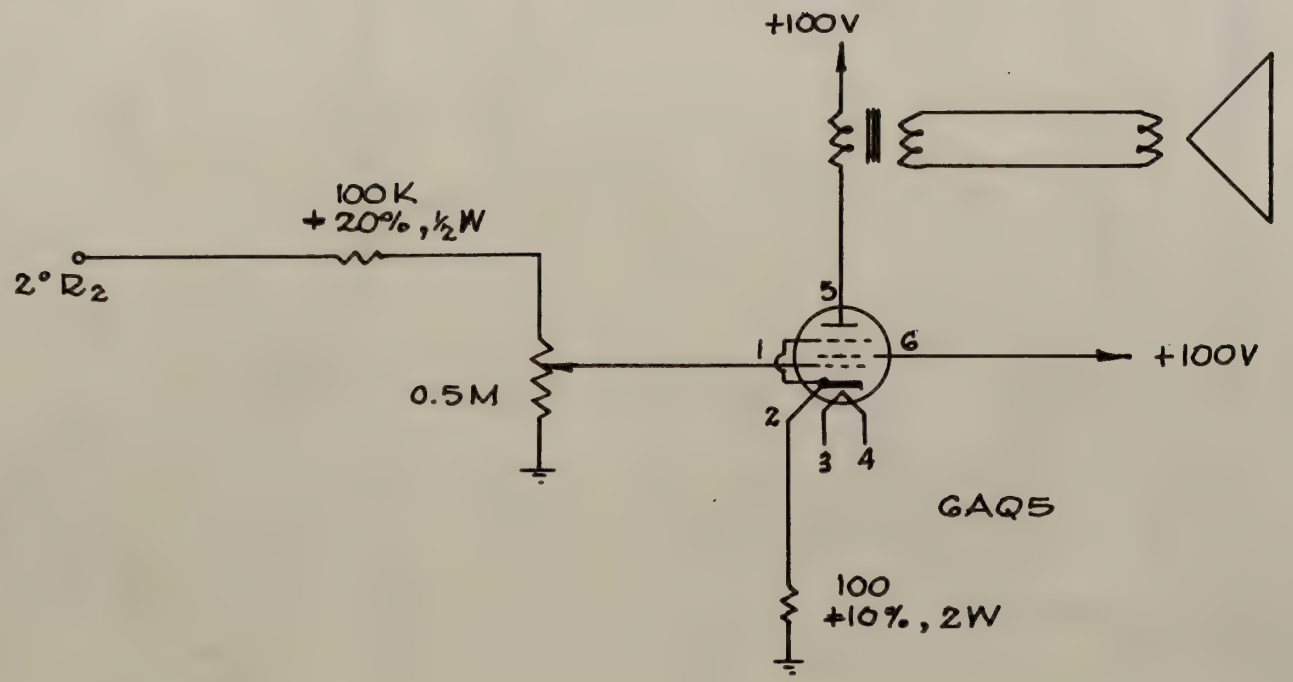
FOR JMW BY HMW CHECKED J.M.W. APPROVED R.E. Meagher DATE 1-18-52

TITLE ~ MIXING CKTS. FOR PULSES ON WII #10

S-378



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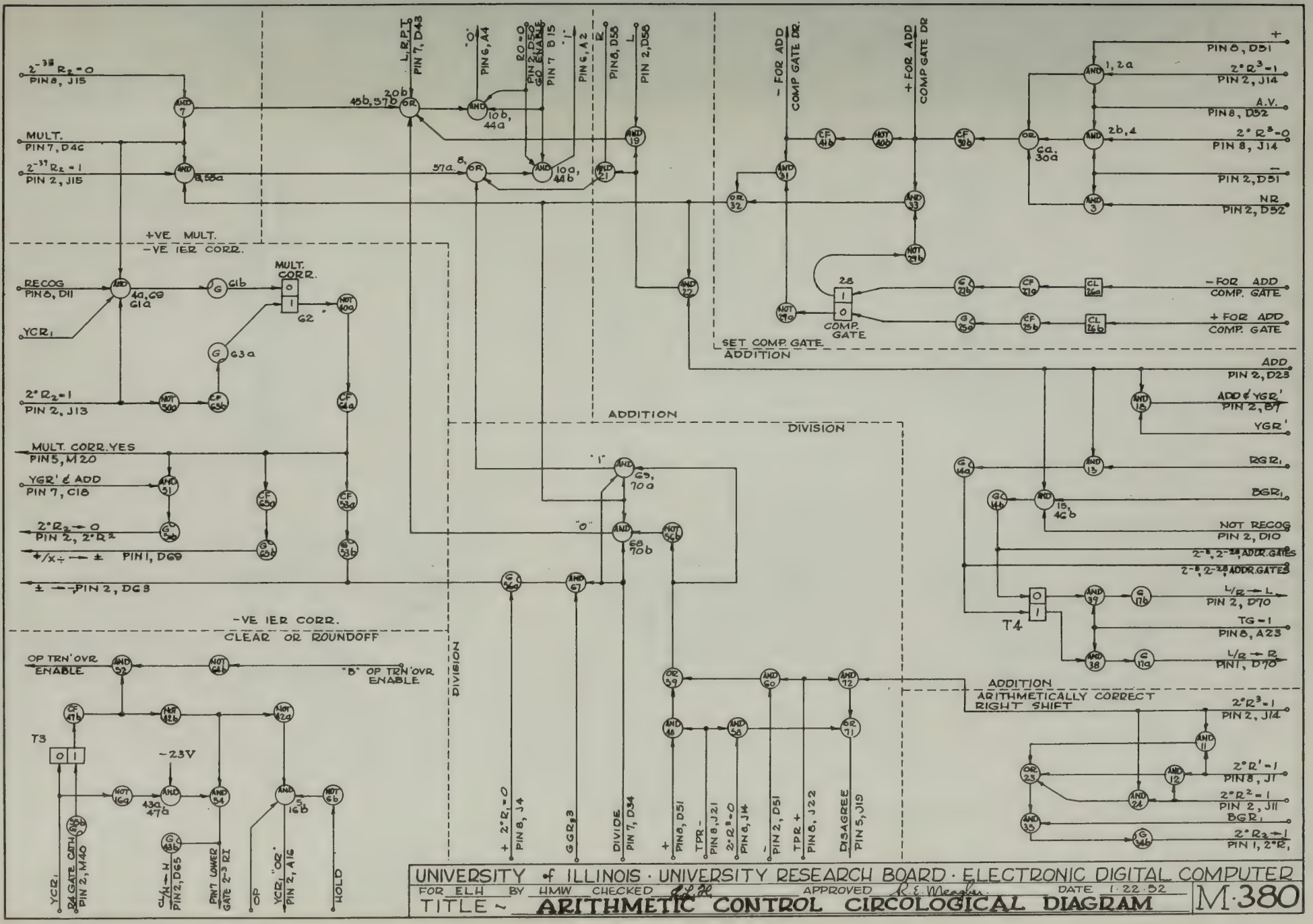
FOR TS BY HMW CHECKED T. SHAPIN APPROVED R. E. Meagher DATE 1-21-52 S-379

TITLE ~ LOUDSPEAKER CHASSIS



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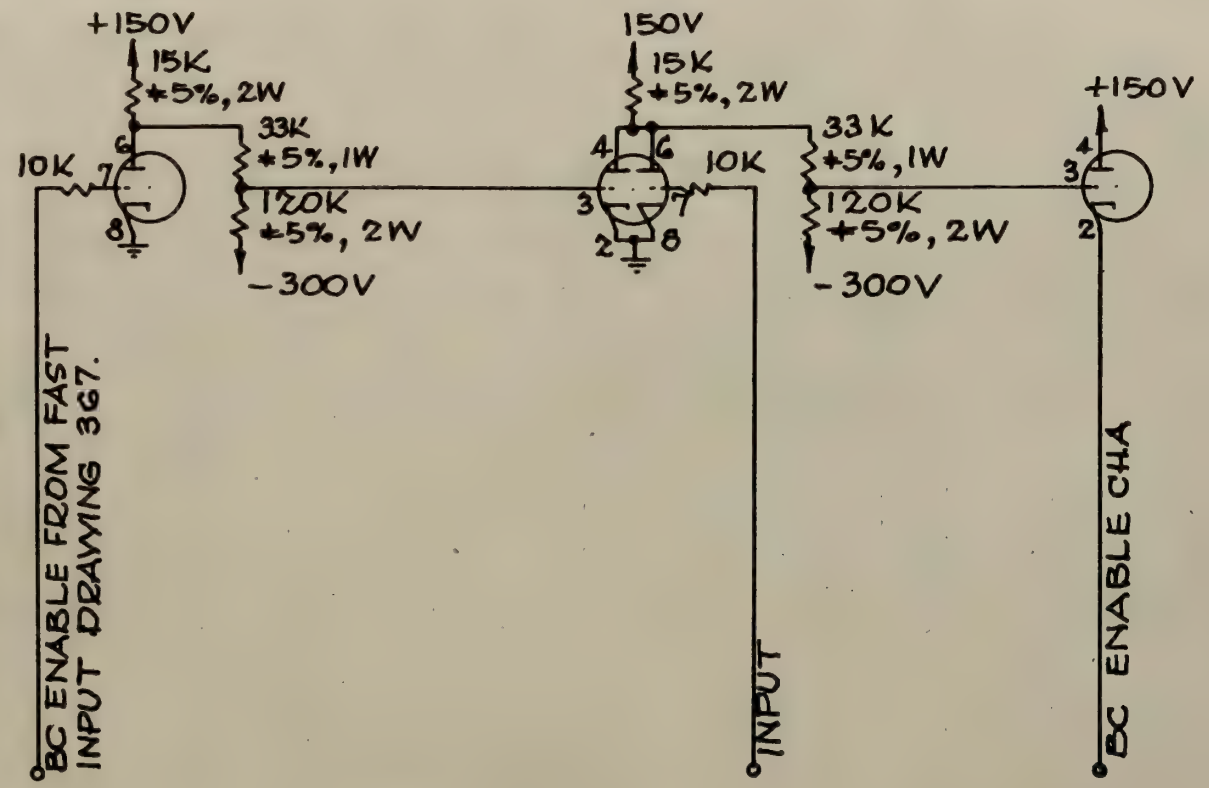
FOR ELH BY HMW CHECKED APPROVED R. E. Meagher DATE 1·22·52

TITLE: **ARITHMETIC CONTROL CIRCOLOGICAL DIAGRAM**

M·380

RESISTORS NOT SPECIFIED ARE ±20%, ½W.



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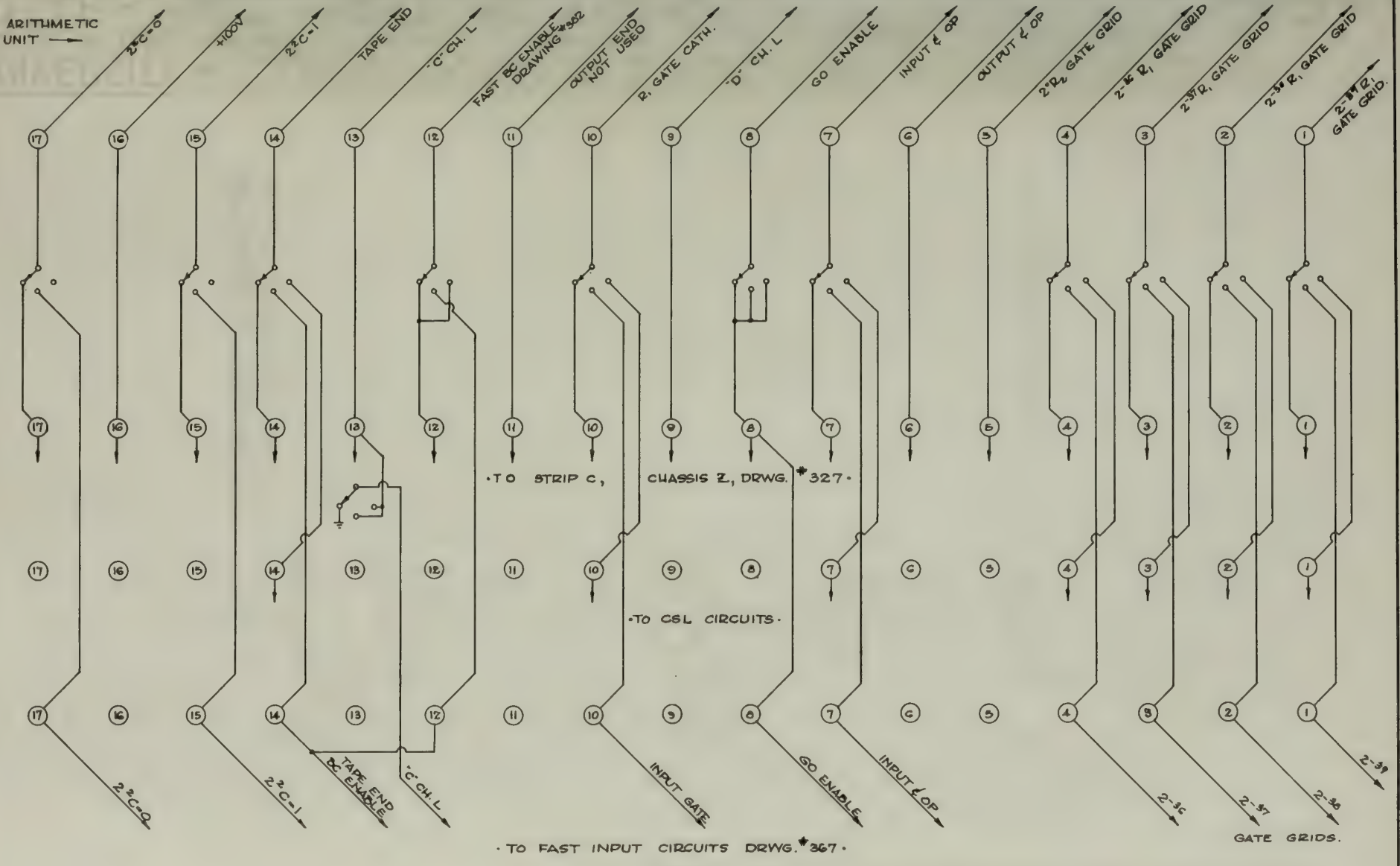
FOR T.S. BY HMW CHECKED T. SHAPIN APPROVED R. E. Meagher. DATE 1·25·52 S·382

TITLE ~ FAST INPUT BC ENABLE



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FOR TS BY HMW CHECKED T. SHAPIN APPROVED R. E. Meagher DATE 1-29-52

TITLE ~ INPUT SWITCH

M-383

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3 0112 084228219